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DEVOTED TO SCHOOL AND HOME

EDUCATION

J. P. WICKERSHAM, EDITOR.

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THE
SCHOOL JOURNAL
ORGAN OF THE DEPARTMENT OF COMMON SCHOOLS AND OF THE STATE TEACHERS' ASSOCIATION.

Vol. 27. JANUARY, 1879. No. 7.

STARS AND STAR GROUPS OF OUR WINTER HEAVENS.*

PLEASANT AND PROFITABLE WORK FOR WINTER EVENINGS.

PREVIOUS to opening of Monday evening session, for three-quarters of an hour, Mr. J. P. McCaskey, Principal of the Boys' High School, Lancaster, gave a sciopticon exhibition for the entertainment of the members of the Institute, using the Marcy light and a five-foot disk, and presenting many choice and artistic views, both colored and plain, of historic buildings, natural scenery, interesting objects in nature, portraits of distinguished characters, Rogers' groups, rare pieces of sculpture, beautiful fancy sketches, etc., closing the series with a single view introductory to the subject of Stars and Star Groups, which the exhibitor designed bringing to the attention of the Institute during the sessions of the week.

THE SPECIMEN STAR.

The last view which was thrown upon the canvas showed, in very striking form, the relative sizes of the Sun and the several planets of the solar system. It was designed to impress vividly the startling thought that our Sun —so enormous of size as we know it to be, of an immensity so overwhelming in comparison with the Earth—is neither more nor less than a specimen star, one of many millions of similar self-luminous bodies, some larger and others smaller than itself. The diameter of Jupiter, the largest of the planets, being eleven times that of the earth, its bulk must be over thirteen hundred times as great; the diameter of the Sun being over ten times that of Jupiter, its bulk is more than one thousand times that of said planet; so that the mass of the Sun would make nearly *fourteen hundred thousand* Earths as large as our own. Or, to present this fact in another shape: The volume of the Sun—which some one has happily styled "our nearest star"—is *six hundred times* greater than that of all the planets revolving around it! So much for our "specimen star." Knowing something of the great size of the Earth, we may, with these comparisons in mind, acquire some faint idea of the size of the individual stars, which, in countless numbers, nightly begem the sky over our heads, exciting our wonder, and at times stirring within us the emotion of sublimity to the profoundest depths of which our natures are capable.

This view is presented as the very best starting point we know for our proposed observation of the stars. Give the pupil a clear and definite idea of what the stars are, of their enormous magnitudes, and the almost infinite distances from our Earth, and from one another, at which they are placed His interest is thus aroused to know more of so grand a science. He will begin for himself

* From Report of Proceedings of Lancaster County Institute, recently issued. These platform talks, somewhat disconnected, are presented in the hope that they may be suggestive and useful to many teachers and others in all parts of the State, who have often wished to know something of the starry heavens, but have thus far happened upon no means, at once simple and satisfactory, of acquiring this knowledge. No effort has been made to throw them into a single continuous article, but they are given as reported, with stars thrown in, suggestive of the general topic, and at the same time to indicate extended intervals when topics other than Stars and Star Groups were under consideration.

to look up to them, to note them singly, and soon to trace out in the sky the various diagrams from the star list that may be assigned to him.

But few people know anything of the constellations, and yet the knowledge is so easily acquired and so readily communicated, especially to growing boys and girls, that any teacher of average ability can make this one of the most interesting, delightful and profitable subjects presented in his or her schoolroom. And the best feature of the matter is, that certain impressions made here will never be lost, while much that is learned can never be forgotten by the youthful observer.

* * *

It is surprising that any human being should go through life without being at times struck by the beauty of the sky above him, and led to acquire some knowledge of its most brilliant and remarkable stars. In this and succeeding talks it is not intended to teach the science of astronomy, but only to give methods of tracing some of the constellations in the heavens as they are now seen, and to present the names of their principal stars. Last evening the sciopticon gave us the relative magnitudes of the sun and planets; and this sun, so immense in comparison with the earth on which we live is but one of an innumerable multitude of stars—*fixed* stars we call them, though they are known to be in motion—a motion imperceptible to us on account of their inconceivable distance. Only a few of these distances have been measured, and those by using the long diameter of the earth's orbit, 184,000,000 miles, as a base line.

The winter sky in our latitude is the most brilliant of the year, and we are just entering upon the season when observation of the stars is most richly repaid. Every one has seen Or'ion and the Ple'iades; they have been known since the days when the book of Job—the oldest book in the Bible—was written, in which reference is made to them by name. The Pleiades are now visible early in the evening in the eastern sky; the brighest of them, *Alcy'one*, is estimated to be 1200 times as large as our sun, and is said by astronomers to be at or near the centre about which the sun, with its dependent planets, describes its tremendous orbit – an orbit so vast that in the entire period since observations have been recorded, only *seven minutes* of its mighty sweep have been transversed. Farther to the east is *Aldeb' aran*, a brilliant star, at one extremity of a V-shaped figure composed of five stars called the Hy'ades, the other four being less brilliant. This figure outlines the face of the Bull (Tau'rus, the second sign of the Zodiac), and Aldebaran is in one of the eyes. The Ple'iades are in the neck of the Bull. South-east of Aldebaran rises Ori'on, the grandest of all the constellations, and one that is familiar to many of you. This constellation is directly over the equator, and hence visible from pole to pole. The four stars forming the oblong figure which outlines the body of the hunter are *Betel'guese* (*geese*), a brilliant red star in the right shoulder; *Bella'trix*, in the left shoulder; *Ri'gel*, in the left foot; and *Saiph* (*Safe*), in the right knee. The "Belt" is composed of three bright stars, sometimes called the "Bands of Orion," the "Three Kings," the "Ell and Yard," "Jacob's Rod," "The Rake," "Napoleon," etc., and named respectively *Min'taka*, *Ani'lam*, *Ani'tak*. Westward from Aldebaran and the Pleiades we have two stars in the constellation Aries the Ram, named *Ari'etis* and *Mesar'tim*, and still farther west is the Great Square of Peg'asus—three of its angles being marked by *Sche'at*, *Mar'kab*, *Al'genib*, in Pegasus, and the fourth by *Al'pheratz*, in the head of Androm'eda. These four stars are in pairs about fifteen degrees apart. As the Square is now nearly overhead in the evening it is well to become acquainted with it first, and to use it as a centre from which to run our lines in different directions and fix the positions of stars in the various quarters of the heavens.

* * *

Before the regular hour for opening the evening session, Mr. McCaskey gave the Institute a second series of sciopticon views of the same general character as on Monday evening, announcing the names of the several views as they were thrown upon the canvas. Previous to "Alloway Kirk and the Burns Monument," which was the last of the evening and introductory to the lecture on Burns that was to follow it, some three or four

ASTRONOMICAL VIEWS

were presented, representing the relative sizes of the planets of the Solar System; the relative size of the sun, as seen from the different planets in their order from Mercury to Neptune—appearing great of size to the former and but little more than a twinkling star to the latter, which is distant 1,835,000,000 miles from the mighty centre of the system; also, the well-known constellation of the Pleiades, as seen through any telescope of moderate

power, and embracing some seventy stars; certain double stars, as Castor; stars with telescopic companions, as Vega and the North Star; the star in Centaurus, which is resolved by the telescope into innumerable suns; and, perhaps most striking of all, the representation of a star of the first magnitude, as Sirius, Betelguese, or Capella, seen through a telescope of very high magnifying power. *No disk is ever had through any telescope upon any star!* We may see the planet, round as the Sun or the Moon, but no star ever appears other than a simple point of quivering light intensely brilliant.

When a telescope of high power is turned upon one of the largest stars, as it comes into the field of the instrument, the effect of the increasing light is compared with that of the rising moon. And yet—we repeat the statement already made, in order that the thought may be driven home to your minds—its distance is so immense that it is impossible to bring it near enough to reduce its enormous sphere—in many cases, no doubt, a million miles in diameter—to even the smallest disk!

As we look out upon the stars innumerable, and reflect that each of them is, in all probability, a central sun, more or less like our own, with its retinue of planets, and that these planets are doubtless, in large proportion, inhabited by intelligent beings—for God wastes nothing, and has made nothing in vain—can it be otherwise than that, in the atmosphere of such a thought, things little and mean should be dwarfed to their true proportions and fade from sight; while the feeling of awe and reverence for the might, the wisdom, and the goodness of God is deepened and intensified? The more the mind dwells upon subjects of this character the more the heart is impressed by them, until we come to stand by night, with the devout astronomer, beneath the dome of this majestic temple, "fretted with golden fires," one thought alone filling our heart and his, that of the prophet of old, "What hath God wrought!" And this is culture of the best; it is this which should be the supreme end of all educational training.

Our Solar system forms part of a great stellar system, or nebula, which includes not only the constellations conspicuous at one time or another during the year in our evening sky, but also the entire Milky Way, with its millions of stars! This nebula is supposed by astronomers to be much longer than broad, shaped somewhat like the capital letter Y, but with the two branching arms closer together than they usually appear in said letter. Our sun, with its attendant planets, is thought to be somewhere near the junction of the two arms.

When we reflect that this is but one of nearly a thousand nebulæ, or star systems, each no doubt occupying its fixed place in the universe, moving as a unit, according to fixed laws, attracted by and dependent in some degree upon every other of the thousand or more star systems known and unknown to the astronomer—when we consider the measureless depths of immensity and the infinite number of suns which these thousand or more nebulæ comprise, each of these suns being in all probability the light and life of its retinue of planets – the view broadens, orbing more and more grandly, until nothing remains beyond but the Eternal God.

* * *

The constellations which have thus far been given and those which are to follow are so well marked that once seen, some of them at least will always be remembered. Teachers owe it to themselves to learn something of Nature above and around them, in order that they may direct the attention of their pupils to subjects that will afford unfailing sources of pleasure throughout their lives. Those whose attention is called to these subjects late in life for the first time, have great reason to regret their loss Carlyle says on this subject:

> For many years it has been one of my constant regrets that no schoolmaster of mine had a knowledge of natural history, so far at least as to have taught me the grasses that grow by the wayside, and the little winged and wingless neighbors that are continually meeting me with a salutation which I cannot answer, as things are. Why did not somebody teach me the Constellations, too, and make me at home in the starry heavens which are always over head, and which I don't half know to this day? I love to prophesy that the time will come when the schoolmaster will be strictly required to possess these two capabilities, and that no ingenious little denizen of this universe be thenceforward debarred from his right of liberty in these two departments, and doomed to look on them as if through grated bars all his life.

We have learned something about the first two constellations which gave their names to the signs of the Zodiac; the third, Gem'ini, or the Twins, lies east of Taurus, and the two principal stars, *Cas'tor* and *Pol'lux*, mark the heads of the two figures at the northern end of the constellation as it now appears in the eastern sky about 10 o'clock in the evening. The outline of their bodies is marked by an oblong figure, the brightest star of which is *Alhe'na*, and the others are *Wa'sat*, *Te'jat*, and *Mebus'ta* or *Meluc'ta*. To the northwest of Castor and Pollux is a large pentagonal figure, one angle of which is marked by an ex-

ceedingly brilliant star named *Capel'la*. This constellation is Auri'ga, the Wagoner, who carries a goat upon his shoulder, and her kids in his pouch—these latter marked by three faint stars in an isosceles triangle below Capella. The distance of this star is estimated at seventy-two light years from our earth, that is to say, while the light is but eight minutes on its way from our sun to the earth, it requires the enormous period of *seventy-two years* to reach us from Capella! The other shoulder is marked by *Menka'lina*. One of the feet, which touches the tip of the Bull's horn, is marked by the star *El Nath*. This star is therefore in both constellations The tip of the other horn makes an isosceles triangle with El Nath and Aldebaran.

A line drawn southward through Sche'at and Markab (or the west side of the Square of Pegasus) passes east of a brilliant star in the Southern Fish, named *Fo'malhaut*. Southward through the eastern side of the Square we have *Diph'da*, in Cetus, the Whale. Between these lines we now see Saturn, which by this time next year will be some twelve degrees from its present position—its year being equal to thirty of our years, while Jupiter, which remains one year in each constellation of the Zodiac, its year being equal to twelve of our own, now blazes in the southwestern sky in the early evening, the most brilliant of all the planets or stars now visible. West of the Square of Pegasus, you will notice a bright star with two fainter ones at equal distances on either side, the three stars making a short straight line; these mark the constellation Aquila, the Eagle; the bright star is *Altair'*, the other two, *Alshain* and *Tara'zad*, the last named being farthest north. Toward the zenith from this constellation we find a quadrilateral of faint stars at no great distance, known as the Dolphin, or Job's Coffin. Northwest from the Eagle, and at a considerable distance from it, a very brilliant star, *Ve'ga*, marks the constellation Lyra, the Harp, which includes also the four faint stars close by, forming a parallelogram, the two farthest from Vega being *She'liak* and *Su'laphat*, the former being nearest the horizon as it sinks in the western sky. All these constellations are readily distinguished by their principal stars, and you will be surprised to find how rapidly your celestial map fills up, and how soon the diagrams of the leading constellations become familiar.

So far as my own limited observation and experience go, I have found no other subject of study that returns so much for so little—affording so rich return of gratification for so little outlay of time and effort. After we have once learned their positions and names, the stars, as they come up from season to season, are welcomed more and more gladly as old friends, whose coming again we hail with ever-increasing pleasure after each successive half-year's absence.

You see how our star list grows upon us, from the fact that we proposed at first to take but twenty-five of those more conspicuous, but have already exceeded that number. We have not yet decided where the list shall end, but it is hoped that most of the teachers present will take notes, and give their schools the benefit of any practical hints received here as to the study of the constellations.

* * *

Some three-quarters of an hour before the regular opening of the evening session was occupied in reviewing from the black-board the numerical list and the diagrams of Stars and Star Groups already given. It was found that some forty or fifty teachers had been looking up the constellations whose position at a given hour had been described, and whose outlines indicated by their leading stars This number, though encouraging, was pronounced far too small, since, to learn, it needs only to look up intelligently into the sky. The teachers were congratulated on having come to Lancaster, it being an excellent place from which to see the stars! There are many other places, no doubt, very favorable for such observations, but the lecturer had seen them so often from this that he could commend it without hesitation from satisfactory personal experience.

There is one constellation in particular which, if the nights are clear, should be familiar to every member of the Institute before the close of the sessions He referred to Orion, grandest of all, now visible after nine o'clock in the south-eastern sky, a diagram of which had been given. This constellation, as has been said, can be seen from all parts of the earth. It has been a star group of interest to countless millions since before the dawn of history. Nor should the Pleiades, now (Nov. 13) half way up the eastern sky by nine o'clock, be unknown to any who read the Bible, or who have enjoyed Tennyson's "Locksley Hall," in which he sings:

> Many a night from yonder ivied casement, ere I went to rest,
> Did I look on great Orion sloping slowly to the West.
> Many a night I saw the Pleiads, rising thro' the mellow shade,
> Glitter like a swarm of fire-flies tangled in a silver braid.

Those who have read neither the Bible nor "Locksley Hall," can hardly plead ignorance of the *Almanac*, since everybody knows more

or less of that. Well, let us hear what Baer's Almanac—which I picked up to-day to bring to your notice, and which is an authority through all this region—has to say of the stars for the present month. Turning to November, 1878, we find, in the column of "Miscellaneous Particulars," the following facts of interest to such persons as *do* know how "to read the almanac,"—which would probably average less than one in a hundred, or it may be one in a thousand!

The first column here given is taken from the almanac already named. Some hints in the second column, and the explanation of the characters used, which is given below, will simplify this matter of

"READING THE ALMANAC."

1	♀ rises 6.1	1. Venus, 6:1 a. m.
2	Fomalhaut so. 8.16	2. On the meridian —farthest south.
3	Orion rises 8.46	
4	Sirius rises 10.58	4. In Canis Major.
5	☌ ☽ ♄. ♄ so. 9.30	5. Conjunction of Moon and Saturn
6	☽ in-apogee	6. Farthest fr. earth
7	♃ sets 9 28	7. Jupiter sets at 9:28 p. m.
8	☿ in Aphelion	
9	♀ rises 6.19	
10	7* south 12.38	8. Mercury farthest from the Sun.
11	♃ sets 9.10	
12	♄ souths 9.2	10. Pleiades, 7 stars.
13	Wega sets 12.0	12. Saturn on meridian.
14	Spica rises 4.33	
15	Rigel rises 7.17	13. Vega, in Lyra.
16	Aldebaran rises 6.5	14. Spica, 4:33 a. m.
17	♀ rises 6.42	15. In Orion.
18	♃ sets 8.55	16. In Hyades.
19	Orion rises 7.40	
20	♄ souths 8.36	21. Sun enters the constellation Sagittarius.
21	☉ enters ♐	
22	♂ rises 5.0	22. Mars rises 5 a.m
23	Andro. souths 8.5	24. Moon, Mercury, and Venus in conjunction.
24	☽ ☌ ♀ ☿	
25	7* south 11.43	
26	□ ♅ ☉. ♄ so. 8.6	25. On meridian.
27	Sirius rises 9.32	26. Herschel and the Sun 90° apart.
28	☌ ☽ ♃. ♃ sets 8.42	
29	♄ stationary	30. On meridian at 9:32 p. m.
30	Arietis souths 9.32	

♃ Jupiter. ♄ Saturn. ♂ Mars. ♐ Sagittarius. ☉ Sun. ♀ Venus. ☿ Mercury. ☽ Moon. ♅ Her. ☽ Moon in apogee, farthest from the earth. ☌ Conjunction, planets in same longitude. □ Quartile, when 90° apart.

A gentleman who was present on Monday evening last, and saw thrown upon the canvas the view representing the relative sizes of the Sun and the planets, says that he does not believe anything of the sort—to his mind it is simply impossible to know these facts with any such degree of accuracy. Personally, he has a right to express his opinion, but he has never given the subject any attention, and therefore can have no knowledge of how accurate the mathematical work done in the science of astronomy. If eclipses are predicted years before they occur, not only as to the month or the day, but even to the hour, the minute, and almost to the second, of contact, is it more wonderful that the astronomer should be able to calculate the distances and dimensions of the sun and the planets with equal certainty as to his results? Any one who will acquaint himself with the work of the astronomer will be convinced of its wonderful accuracy, since no science is more exact, everything being strictly mathematical. So confident are those who are devoted to the science of the accuracy of their observations and of their deductions from the same, that Prof. Newcomb, who is an authority on this subject, in his "Popular Astronomy," recently issued, makes the following extraordinary assertion:

> Should the reader ask what Practical Astronomy is, the best answer might be given him by a statement of one of its operations, showing how eminently practical our science is: "Place an astronomer on board a ship; blindfold him; carry him by any route to any ocean on the globe, whether under the tropics or in one of the frigid zones, land him on the wildest rock that can be found; remove his bandage and give him a chronometer regulated to Greenwich or Washington time, a transit instrument with the proper appliances, and the necessary books and tables, and, in a single clear night, he can tell his position *within a hundred yards*, by observations of the stars." This, from a utilitarian point of view, is one of the most important operations of practical astronomy.

One of our Lancaster watches, properly adjusted, would, no doubt, answer his purpose quite as well as the chronometer referred to, since it is regulated to the meridian of Washington: the *tick of the clock* in the National Observatory at Washington being transmitted by telegraph to the adjuster's room in the Lancaster Watch Factory every day at twelve o'clock, and heard as distinctly as though we stood before the clock itself in the Observatory. This by way of parenthesis, but the miracle of wonder remains: That man has acquired the ability, under such seemingly unfavorable circumstances, after the observations and calculations of a few hours, to fix his exact whereabouts—"within a hundred yards"—upon the surface of this great globe, two hundred millions of square miles in extent!

Those who have been looking for Vega in the north-western sky may have noticed, to the east of the Harp, the large constellation,

Cygnus, the Swan, which is outlined by five stars forming the figure of a Cross. The brightest star, in the top of the Cross and the tail of the Swan, is called *De'neb* Cygni; the centre is *Sad'r;* in the southern arm is *Gie'nah;* in the northern arm is a star not named but designated by the Greek letter δ; and the foot of the Cross, or beak of the Swan, is marked by *Albi'reo*. Between the centre and the foot, somewhat nearer the former, is a variable star, whose period of change is 405 days. This constellation is also called the Northern Cross; and those who have seen both say the resemblance to the figure named is much more striking than in the case of the Southern Cross, though the latter constellation has more brilliant stars. The star 61 Cygni, invisible to the naked eye, was the first of the fixed stars whose distance was measured.

We have already given Alpheratz in the head of Andromeda. A line drawn from that star to *Capella*, passes near *Mi'rach* in her belt, and *Al'ma ach* in her left foot; and still farther east is *Al'genib*, in the constellation Perseus. *Al'gol*, in the head of Medu'sa, (which Per'seus' holds by the hair), forms a right angle with the two stars last named, and is itself very remarkable on account of its variations. It changes from the second to the fourth magnitude in 3½ hours, and back again in the same time; remains steadily brilliant for 2¾ days, and then the changes recur. The most satisfactory theory of this variation seems to be that dark spots on the surface are regularly turned toward us by the revolution of the body on its axis. There will be no difficulty in observing this variation, as Algol is visible every evening from September to May, and the loss of brightness is quite perceptible to the naked eye.

* * *

We have just heard, from the Book of Proverbs, the apostrophe of Solomon to Wisdom. This, indeed, is the end of all knowledge, for without it knowledge in itself is weak and blind. "Knowledge comes but wisdom lingers," is a truth at once sad and solemn. All along the highways of science are the finger-boards that point onward to Deity. Mere knowledge alone cannot interpret their meaning; only he who has reached the higher plane of Wisdom can read the writing upon them. The chief reason for introducing the subject of the stars to your notice at this time, is because this, more than any other science of which we know anything, seems to lead directly up to God. Along with the knowledge, so readily obtained here, there comes, naturally almost, to him whose eyes are "open," that higher wisdom which recognizes constantly the omnipotence and omnipresence of the Creator of the universe. In our teaching, here as elsewhere, this thought should be kept prominently in view, if we would insure to our pupils the best, because the most profitable, instruction.

As to the distances of the planets and stars of which something has already been said, and of which something more definite should be given before leaving a branch of the subject so important, Prof. Newcomb, whose "Popular Astronomy" has already been quoted, puts it much as follows: Suppose that a voyager through the celestial spaces could travel from the sun to the outermost planets in our system in twenty-four hours. So enormous would be his velocity that it would carry him across the Atlantic Ocean from New York to Liverpool in less than *one-tenth of a second* of the clock. Starting from the sun with this velocity he would cross the orbits of the inner planets in rapid succession, and the outer more slowly, until, at the end of a single day, he would reach the utmost confines of our system, crossing the orbit of Neptune. But, though he passed eight planets the first day, he would pass none the next, or the next, for he would have to journey eighteen or twenty years without diminution of speed, before he would reach the nearest star, and would then have to continue his journey as far again before he would reach another. All the planets of our system would have vanished in the distance in the course of the first three days, and the sun would be but an insignificant star in the firmament, at the end of even that brief period.

In the east you will see, about 9:30 o'clock, a brilliant star with a fainter one a little farther west. These are in Ca'nis Mi'nor, the Little Dog, and are named respectively *Pro'cyon* and *Gomel'za*. South from these and east of Orion is the brightest of all the fixed stars—*Sir'ius*, in Ca'nis Ma'jor, the Great Dog, commonly called "the dog star." The Egyptians believed the excessive heat of the "dog days" was owing to the proximity of Sirius (the Dog Star) and the Sun. South-east of Sirius, in the same constellation, are three bright stars forming a small but beautiful triangle, and named respectively *We'sen*, *Adha'ra* and *Alu'dra*, the first named being at the vertex, and *Aludra* farthest east. Procyon, Sirius and Betelguese form a great triangle which will be readily recognized by all who look for it.

In the northern sky some of you may have seen this evening seven stars forming what, from its shape, is well known as the "Great Dipper." These are all in Ur'sa Ma'jor, the handle of "the Dipper" being the tail of the Bear. The two stars on the outer side of "the Dipper," *Me'rak* and *Du'bhe*, are known as "the pointers" because they form a line with the North Star, distant 28¾ degrees. The other stars in "the Dipper," as we go toward the end of the handle, are *Phad*, *Me'gres*, *Ali'oth*, *Mi'zar*, and *Benet'nasch*. Mizar has a companion star so small that sharp eyes are needed to detect it on most nights. It is named *Alcor*, and, Humboldt says, is not visible in Europe. At the tip of the tail of Ursa Minor, the Little Bear, which is the end of the handle of the "Little Dipper," is *Polar'is*, or *Al'rucca'ba*, usually known as the North Star. The "pointers" will enable you to find it quickly and surely. as it is the first star of any magnitude in line with them.

Ko'chab and *Pher'kad* are the stars forming the lower side of the bowl of the Little Dipper, the latter being in the rim of the bowl. Pherkad is known as one of the *Guards*, two stars that, like the "pointers" in the Great Dipper, make nearly a straight line with the North Star. *Thu'ban*, in the Dragon, is a faint star, half-way between Pherkad and Mizar. It is especially interesting from the fact that it was the North Star some 3000 or 4000 years ago, at the time the Pyramids were built. *Rasta'ban* and *Etan'in* are in the head of the Dragon, and will be readily found in one of the lines given elsewhere in connection with the list of stars *Aldera'min* and *Al'phirk* are the principal stars in Cephe'us, and will be readily found from the lines given. In the double triangle in Cassiopœia's Chair—on the opposite side of the Polar Star from the Great Dipper, and at about the same distance from said star—the acute-angled triangle has *Caph* for its first star; the next, at the vertex of the triangle, is *Sche'dir;* the star at the vertex of the obtuse-angled triangle is *Ruc'ba*. These can all be readily recognized and named by the aid of the lines and figures given with the star list.*

Many of the stars which have been named, though appearing single to our eyes, are really star systems, being composed of two or more suns. Polaris is double, so also Vega, Castor, and Rigel; Pollux is quadruple.

A chart was shown giving the apparent size of the Sun as seen from the several planets, large from Mercury and very small from Neptune, on the confines of the solar system. The only planets visible to us without the aid of the telescope are Venus and Mercury, between the Earth and the Sun, and Mars, Jupiter, Saturn, and Uranus, or Herschel, whose orbits are outside that of the Earth. The rest of the planets, (as the Asteroids) are too small, and Neptune is too far distant, to be seen with the naked eye. The planet Mercury is seldom seen. It is named from the god in Roman mythology who was the patron deity of thieves and such other lurking characters as come and go unexpectedly, desirous of keeping out of sight.

Most people who look up into the sky have, at one time or another, seen Venus, Mars, Jupiter, and Saturn. The two last named are now above the horizon. Comparatively few persons, however, have seen the planet Mercury. It is faint and never appears far above the horizon. The lecturer had seen it several time—once last summer, when a paragraph in the *Ledger* named the constellation in which, and the star near which, it might be looked for shortly after sunset. It could not be readily distinguished in the early twilight but an opera glass at once brought it into plain sight.

We had seen it also on a former occasion, at Louisville, Kentucky, during the

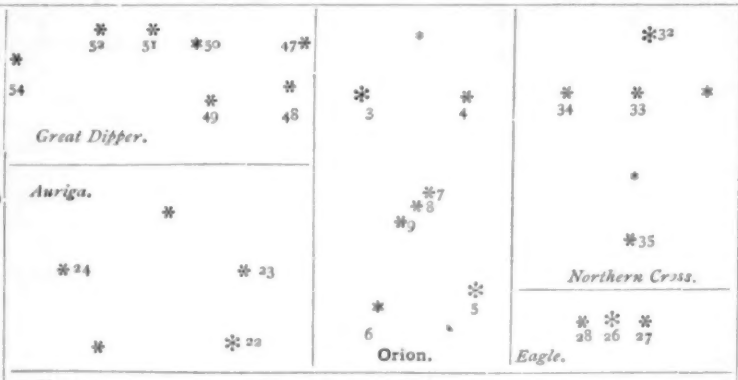
TOTAL ECLIPSE OF THE SUN

in August, 1869. Of course, everybody knows the machinery of an eclipse, just what it is, and how it is caused. The memorable eclipse of 1869, which is mentioned at length by Newcomb, was the most sublime sight, the starlit sky alone excepted, that we have ever beheld. We had gone down to Kentucky at that date, so as to include Mammoth Cave and the total eclipse in the same trip. The former well repaid our visit, as we took both the "long" and the "short" routes, and saw all the wonders of the great cavern, penetrating as far as the famous "Snow-Ball Room," some seven miles distant from the entrance. But the eclipse was worth a thousand Mammoth Caves!

The day was cloudless. On reaching Louisville from Cave City, about noon, the hotels were found well filled with strangers from far and near, drawn together by a common interest, and the place all alive in expectation of the coming event. Taking the street cars which were advertised as reaching the best point of observation, we were directed to a

* NOTES.—The names of the stars are spelled differently in the various text-books, and almost uniformly without accent. We have, within the last few days, found, in the latest edition of Whitall's Planisphere, an accented list of these names prepared by Rev. E. H. Supplee, of Philadelphia. As there seems no other to be had with which to compare, and it being desirable that there should be some degree of uniformity in this matter, we

have, in nearly all cases, adopted, in list given below, the pronunciation approved by the gentleman named. . . . As everybody knows, the distance from zenith to horizon is 90°; the length of the lines indicated herewith in degrees can therefore be readily estimated. Triangles have not been used, as they occupy too much space for our purpose, and a little ingenuity will enable the teacher to make them by the dozen, of all kinds and sizes. It is taken for granted, in running these lines, that the student will begin by learning the Great Square of Pegasus, Orion, the Pleiades, the Dipper, Sirius, Vega and Capella. He can then, with the points of the compass occasionally noted along with his lines, fix with readiness and certainty every star named in the list here given. The stars marked for a given line may be some degrees from it, but they are always in the *general direction* of the line, and near enough to be recognized. The lines themselves are designed merely as an approximation to accuracy—a hint or suggestion as to direction and distance—but it is believed they will be of great use to any one who is resolved upon this work. A hint as to the use of thes lines may not be unnecessary. "Two points in a line determine its direction," and each line here given contains at least two points (stars) readily determined. Take, for instance, the second line, in first column: At one end we have Rigel (5), then Anilam (8), then Betelguese (3), and at the other end Pollux (17); between Pollux (17) and Betelguese (3) we find Alhena (18) and Wasat (19)—thus fixing these two fainter stars—the rest, or any two or three of the rest, being known. The distance is given as about sixty degrees (60°), equal to two-thirds the distance from zenith to horizon, or about four times the distance between the stars in any side of the Great



| FIXED STARS. | | |

slight elevation in the suburbs of the city, where a large number of people had already assembled. The afternoon wore on, the moment of contact foretold by the astronomer came, and there was the black Moon, on schedule time! distinctly seen through our smoked or colored glass, moving directly upon the face of the Sun. We followed it, through the glass, with perfect faith in the promise that the planet's work would be thoroughly done, until one-half was covered, then three-fourths, then, discarding our glasses, we saw the Sun's crescent narrow slowly down to the merest thread-like curve of light, and then—total obscuration.

The bats were flying abroad, and the birds going to roost in the unnatural twilight whose sombre greenish hue was everywhere. For a few moments we noted the stars and planets (Mercury among them) that had been coming out one by one as the shadows deepened, when suddenly—the Moon centering true for our position on the hill—there flashed out gloriously around its disk of inky blackness the splendid Corona of the Sun!—with "Bailey's beads"—molten silver they looked—in full view at a half dozen points, more than 90,000,000 miles away. This was the supreme moment, the grandeur of the eclipse culminating in its aure'ola of surpassing splendor. We can never forget the cry of surprise and delight that greeted the wondrous spectacle, nor the earnest exclamation, apparently unconscious, of an aged man in the crowd, "Who will say there is no God!" A few moments it blazed magnificently; then, the Moon moving onward from the centre, the glory vanished as suddenly as it had flashed forth upon our startled vision. Soon the curving thread of light appeared on the opposite limb of the Sun and slowly grew, until his entire glowing disk shone clear as before. We would go to San Francisco, had we leisure for the trip, to see again this sight of thrilling grandeur.

But grander than even this are the cloudless heavens of a moonless night, which, if we will, we may have over our heads throughout our whole lives. And nothing else equally sublime is ever seen from God's footstool. That man is little to be envied who can stand unmoved, alone in the still night, under "the hollow shell of stars" that, at the bidding of Jehovah, rolls on silently and without pause forever.

AIDS TO THE STUDENT.

For the information of a number of persons who had made inquiry as to text-books and other aids in the study of astronomy, the following were named: Whitall's Planisphere, published by Lippincott & Co., Philadelphia, costing $3,00 or $3.50, which can be set by any student so as to show the appearance of the heavens at any minute of any night in the year. It is a disk revolving on a flat surface, and the best thing that can be had at moderate cost for the practical study of the constellations. Get the Planisphere which has the mythological figures. Burritt's Geography of the Heavens with the accompanying Atlas, is published by Sheldon & Company, of New York, and costs, we think, $2.25. This standard text-book is the only one which contains the mythology of the constellations given as fully as the student teacher will desire. It has had a very large sale, and deserves long to retain its hold on the public favor. Newcomb's Popular Astronomy is perhaps the latest good book for general use in this science. It is published by Harper & Brother, costs $4.00, and, though rather expensive, is a large work, issued in handsome style. It brings everything down almost to the current year, and supplements admirably the Planisphere and the Geography of the Heavens already named. Among other valuable books are Steele's Fourteen Weeks in Astronomy, published by A. S. Barnes & Co., of New York, price $1.50; Davis's Elements of Astronomy, Cowperthwait & Co., Philadelphia, price $1.50; and Handbook of the Stars, Woolworth, Ainsworth & Co., price $1.25. There is also a series of books comprising three volumes, from the pen of Prof. O. M. Mitchell, the astronomer-General who died in active service during the war of the rebellion. These books would stir the heart of a statue, if the man of stone had head enough to read them.

* * *

It must always be remembered that the *fixed* stars are not fixed in any true sense. They move with inconceivable rapidity, but on account of their immense distance, their motion does not apparently affect their position as viewed from the earth. An explanation was then given of the method of finding

THE PARALLAX OF A STAR,

by the aid of which the distances of some of the nearest stars have been approximately ascertained. It is a simple problem in trigonometry, which is constantly used in navigation and surveying, that, when two angles and the included side of a triangle are given, the remaining sides and angle may readily be found. Observations made during eclipses of the Sun and Moon and the moons of other planets, and upon the transits of the inferior

planets, Mercury and Venus, have enabled astronomers to determine the various distances, etc., in the solar system—these observers being supplied with telescopes and all other aids needed, stationed at different points on the Earth's surface, the distance between which was known, and then working the angles found. But with the most perfect instruments, and the most careful observations made from points on our globe farthest removed from each other, no triangle could ever be secured upon a star—the lines went out always perpendicular to the base line, without the slightest perceptible variation from the right angle. In other words, the base line—though it might be as much as 6000 or 7000 miles in length, or even longer, was too short to obtain any appreciable angle at the star. Astronomers then turned their attention to the enormous diameter of the earth's orbit—184,000,000 miles in length—and after long and careful observation a few triangles were found, a few stars brought within reach of measurement, and their distances from the Earth estimated with some approximation to accuracy.

The means of observation have been so greatly improved, and the shades of variation that can be noted are now so delicate, that the astronomer now measures and works an angle of even less than $\frac{1}{10}$ of a second, or $\frac{1}{360000}$ of a degree. With the star as the vertex of such triangle, whose base is the diameter of the earth's orbit, the divergence of the lines passing towards the earth would not, it is said, much exceed a hair's breadth in a quarter of a mile! Yet these lines, before reaching our solar system, must diverge at the same uniform rate, until they are 184,000,000 miles distant from each other! The angle of 61 Cygni is about ½ second, and this is the nearest star that has yet been discovered. This star is three and a half light years distant—that is to say, while it takes the light eight minutes to reach us from the Sun, it requires three and half years for it to reach us from this, the nearest fixed star! If we could travel a thousand miles a day, it would take two hundred million years to reach that nearest star; and others of the thirty or more that have been estimated are nearly all of them at distances immensely greater. Capella is said to be seventy-two light years distant; and of all the brilliant stars in Orion, not one is within our reach.

Several teachers having asked for the names of Mitchell's books, they were given as follows: Astronomy of the Bible, Planetary and Stellar Worlds, and Popular Astronomy. They may be ordered through any bookseller. The lecturer then, to give the Institute "a taste of their quality," read the following extended extract from one of them:

THE PROBLEM FOR SOLUTION.

The problem presented for solution is simply this: Does an intimate knowledge of the Universe as developed by the grand discoveries of modern science, cause the declarations of the inspired writers to sink into insignificance, or to rise to grander and more stupendous proportions? It can not be denied that such a knowledge as we now possess of the structure of the heavens, does cause the doctrine of the Egyptians, Persians, and Greeks, as already sketched, to appear simply ridiculous. I use the only words which can express my meaning. Even the philosophy of Plato which elevates matter above God, and asserts the power of the Omnipotent to extend only to the organization and not to creation, can not satisfy the demands of the mind imbued with a full knowledge of the revelations of modern science. We are compelled to go backward to the beginning, and propound the mighty interrogatory, Whence sprang the matter of which these multitudinous worlds were formed? Whence the mysterious and incomprehensible principle of light? Whence the still more mysterious and incomprehensible principle of vegetable life? And whence the breath of life, whereby man became a living soul, with thought and reason, joy, sorrow, and love? These questions must be answered, and we find the only satisfactory response in the language of the Bible: God hath created all things and sustaineth all things, by the word of His power.

Leaving this great topic of creation, which we shall treat hereafter more at large, and which we now only mention for the purpose of noting the language employed by the Hebrew writer, let us pass to an examination of the doctrine of God's providence, as displayed in the maintenance of absolute rule in the physical universe.

There are, doubtless, philosophers and astronomers, who in their mathematical and astronomical investigations, leave out of the great problem of nature the very being of God. This, indeed, in the very nature of things, they are compelled to do. No power of analytical grasp, no refinement of infinitesimal arithmetic, can reach the being and attributes of God. The philosopher and mathematician are compelled to begin exactly where Moses left off. In the beginning God created the heavens and the earth, says Moses, and admitting this declaration, the philosopher undertakes to discover the plan according to which this creation was effected, and by means of which it is now maintained. The sun, the moon, the planets, the comets, the stars, exist: they roll and shine, measuring time by their mighty revolutions, and filling space by their sublime orbits. There they are as God created them, and the philosopher simply inquires, According to what laws do they move? What reciprocal influences do they exert? What are the forms and limits of their mighty orbits? What the sublime periods of their march through space? What the nature of the dynamic equilibrium which links them into groupings of surpassing grandeur?

It is true that in all these investigations the very being of God may be forgotten. For the lawgiver we may substitute the laws. Gravitation may supersede, in mathematical research, the omnipotence of God. The laws of motion, simple, invariable, eter-

nal, may stand for that attribute of Jehovah's will which changeth not, the same, yesterday, to-day and forever. The sun himself may be shorn of his effulgence: his light, and heat, and life, may shrink and fade beneath the withering breath of philosophy, and this mighty and glorious orb become a material heavy point, and all the revolving planets and their moons, other material heavy points, at definite distances, and with determinate weights, and thus the will of God, as manifested in His laws, and the very creations of God as exhibited in His suns, and systems, and moving worlds, become the mere hypotheses and material points in the diagram of the mathematician's slate—and what then? Does this destroy God and His attributes? Does this blot out of the heavens the blazing sun? Does this strike from being planet, and moon, and earth, teeming with life, and hope, and joy, and love, and immortality?—Never! They all remain: while the geometer grapples these wondrous orbs in their weight, dimensions, distances, and motions, with his sublime analytic machinery, and with gigantic intellectual power follows their grand career—the problem solved, the orbit figured, the period predicted—all, all proclaim the being of God, the unchangeableness of the laws of His physical government, and the grasp of thought with which He has endowed His own image, into whose nostrils He breathed the breath of life.

It has been truly sung:

"The undevout astronomer is mad—"

and yet, alas! we are compelled in a few instances to confess, that this madness has filled the hearts of some whose names have been written in letters of living light, on the very circle of the heavens. I say a few instances, for by far the greater number of the heroes of science are to be counted among the devout. Copernicus, and Kepler, and Tycho, and Galileo, and the prince of philosophers, Newton the immortal—all looked through nature to nature's God. Kepler, in all his grand investigations, commenced his daily toil by invoking the aid of Divine wisdom, and Newton's reverence was so great, that he never uttered the name of God without reverently lifting his hand to his head, feeling the immediate presence of the Divinity in His material works. And, yet, these are the greatest names which the annals of astronomy and science can boast—their investigations were more profound, their mathematics deeper, than most of those could boast, who are now compelled to acknowledge themselves humble followers of these great luminaries.

* * *

Miss Maria L. Sanford, Professor of History at Swarthmore College, who was one of the instructors, at the conclusion of her suggestive talk on the importance of giving attention to forming a correct literary taste among pupils—by encouraging them to commit short selections in prose and poetry, and directing them to see and enjoy choice things found in their reading books or presented from the teacher's desk—expressed in strong terms her gratification at the introduction, before the Institute, of the subject of Astronomy. Everybody should know something of the worlds above us. She had taught the subject in a common school with interest, and aroused great enthusiasm. Here your literature comes in again: Read to them from the Bible, "Canst thou bind the sweet influences of the Pleiades, or loose the bands of Orion? Canst thou bring forth Mazzaroth in his season? or canst thou guide Arcturus with his sons?"—or quote a few lines of poetry referring to the stars, or read to them a noble poem like the Occultation of Orion, by Longfellow, whose mythological allusions, readily mastered, are most interesting to pupils. She then read with effect, the poem named which is here given:

OCCULTATION OF ORION.

I saw, as in a dream sublime,
The balance in the hand of Time.
O'er East and West its beam impended;
And day, with all its hours of light,
Was slowly sinking out of sight,
While, opposite, the scale of night
Silently with the stars ascended.

Like the astrologers of eld,
In that bright vision I beheld
Greater and deeper mysteries.
I saw, with its celestial keys,
Its chords of air, its frets of fire,
The Samian's great Æolian lyre,
Rising through all its sevenfold bars,
From earth unto the fixed stars.
And through the dewy atmosphere,
Not only could I see, but hear,
Its wondrous and harmonious strings,
In sweet vibration, sphere by sphere,
From Dian's circle light and near,

Onward to vaster and wider rings,
Where, chanting through his beard of snows,
Majestic, mournful, Saturn goes,
And down the sunless realms of space
Reverberates the thunder of his bass.

Beneath the sky's triumphal arch
This music sounded like a march,
And with its chorus seemed to be
Preluding some great tragedy.
Sirius was rising in the east;
And, slow ascending one by one,
The kindling constellations shone.
Begirt with many a blazing star,
Stood the great giant Algebar,
Orion, hunter of the beast!
His sword hung gleaming by his side,
And, on his arm, the lion's hide
Scattered across the midnight air
The golden radiance of its hair.

The moon was pallid, but not faint;
And beautiful as some fair saint,
Serenely moving on her way
In hours of trial and dismay.
As if she heard the voice of God,
Unharmed with naked feet she trod
Upon the hot and burning stars,
As on the glowing coals and bars,
That were to prove her strength, and try
Her holiness and her purity.

Thus moving on, with silent pace,
And triumph in her sweet, pale face,

She reached the station of Orion.
Aghast he stood in strange alarm!
And suddenly from his outstretched arm
Down fell the red skin of the lion
Into the river at his feet.
His mighty club no longer beat
The forehead of the bull; but he
Reeled as of yore beside the sea,
When, blinded by Œnopion,
He sought the blacksmith at his forge,
And, climbing up the mountain gorge,
Fixed his blank eyes upon the sun.

Then, through the silence overhead,
An angel with a trumpet said,
"Forevermore, forevermore,
The reign of violence is o'er!"
And, like an instrument that flings,
Its music on another's strings,
The trumpet of the angel cast
Upon the heavenly lyre its blast,
And on from sphere to sphere the words
Re-echoed down the burning chords,—
"Forevermore, forevermore,
The reign of violence is o'er!"

EDITORIAL DEPARTMENT.

THE SCHOOL JOURNAL.

LANCASTER, JANUARY, 1879.

J. P. WICKERSHAM. . . . . J. P. M'CASKEY.

THE Department of Superintendence of the National Teachers' Association will hold a special meeting in the city of Washington, D. C., during the first week in February. The meetings of this body in Washington during the sessions of Congress have always been productive of the very best results. The forthcoming meeting is expected to be larger and more influential than any of its predecessors. The leading educators of the country will attend it from the North, South, East and West. Papers are expected from Gen. Eaton, of the National Bureau of Education; Consul General Hitz, Switzerland; Dr. Sears, of the Peabody Fund; Judge Strong, of the Supreme Court; Dr. Eliot, Superintendent of the Boston schools; Dr. Philbrick, United States Educational Commissioner at the Paris Exposition; Mr. Apgar, Superintendent of Schools in New Jersey; Mr. Doty, Superintendent of Schools in Chicago; Mr. Orr, Superintendent of Schools in Georgia; Mr. Ruffner, Superintendent of Schools in Virginia; Prof. Walter Smith, of Massachusetts, and others. The discussions will cover the live, national issues now before the country. The proceedings will be so arranged as to bear directly upon the questions of strengthening the National Bureau of Education, the distribution of the proceeds of the public lands for educational purposes, and others now pending in Congress Pennsylvania will, of course, be numerously and ably represented. Programmes, giving in detail the arrangements for the meeting and stating specifically the order of the exercises, will be published in circular form at an early day.

A LARGE part of the educational material belonging to the exhibit of the United States at the Paris Exposition, has, at the special request of the Minister of Public Instruction, been placed in the hands of the French Government. It is gratifying to learn that a fine suite of rooms have been set apart for the display of this material in the *Palais Bourbon.*

AS required by law, *The Journal* for this month contains the annual report of the Superintendent of Public Instruction. It presents for the consideration of the Legislature a number of practical suggestions; but the feature in it that will attract most attention on the part of teachers and school men is an outline of the observations of the Superintendent during his recent tour in Europe. As this outline is itself a summary, our readers will probably prefer to read the report itself rather than any abstract that can be made. With this conviction, therefore, we place the matter in their hands without comment, simply invoking for it thoughtful study.

THE custom has become quite common in the West to organize educational exhibits in connection with State and County fairs, and if reports in the newspapers are to be relied upon, they are very popular. Suppose we try an experiment of the kind in Pennsylvania?

PHILADELPHIA has the honor of having been selected as the place for the meeting of the National Teachers' Association in August next. This great Association will be cordially welcomed to Philadelphia and to Pennsylvania. No city in the Union can present better accommodations for the Association and its several departments; its hotels are numerous and of the best, and its reputation for hospitality is world-wide. Then, outside of the Association, it has unusual attractions

in its International Exhibition, of little less interest than the Centennial itself; Independence Hall, the United States Mint, Girard College, the Academy of Fine Arts, the Academy of Natural Science, the Museum and School of Industrial Art, the School of Design for Women, the Franklin Institute, etc. Besides, some twenty-two years ago, the Association was born in Philadelphia. It now comes back in its first, full manhood.

The President of the Association for the present year is Dr. John Hancock, of Dayton, Ohio, a gentleman of large experience and great energy. Under his leadership the meeting in Philadelphia will doubtless be the largest and most influential gathering of the kind ever held in America. He is assisted by a board of councillors representing almost every State and Territory in the Union.

Let Philadelphia and Pennsylvania prepare in good time for their expected guests, and give them a reception that will leave pleasant memories for all the coming years.

THERE seems to be a necessity for a new and thorough examination of the question of Normal Schools. To meet it we have invited several of the Principals of these schools to prepare papers on the subject for publication in *The Journal*. We shall make the same request of all of them. We have heard enough already to be assured that our invitation will be accepted, and we shall commence, probably in the February number, the publication of the series. These papers will, no doubt, discuss the question from a point of view favorable to the system of Normal Schools as it works in Pennsylvania; but we are advised that there are those in waiting who look upon the matter in a different light and who will probably offer some objections to the anticipated statements of the principals. A fair, open discussion is what is needed, and the truth will triumph.

THE Silicate Slate Company of New York informs us that their orders from Pennsylvania are very satisfactory. The surface itself must be quite satisfactory to those using it, or they would not, as they do from many localities, repeat orders a half dozen times or more since its adoption. The surface is a good one, and deserves its excellent reputation. We have seen it used and know it well.

THE post-office address of County Superintendent J. B. K. McCollum, of Washington county, has recently been changed from California to Washington, Pa.

THE President's Message contains the following paragraphs on education:

> The report of the commissioner of the bureau of education shows very gratifying progress throughout the country in all the interests committed to the care of this important office. The report is especially encouraging with respect to the extension of the advantages of the common school system, in sections of the country where the general enjoyment of the privilege of free schools is not yet attained.
>
> To education more than to any other agency we are to look as the resource for the advancement of the people in the requisite knowledge and appreciation of their rights and responsibilities as citizens, and I desire to repeat the suggestion contained in my former message in behalf of the enactment of appropriate measures by Congress for the purpose of supplementing, with national aid, the local systems of education in the several States.

As seen by his concluding sentence, the President is in favor of granting aid from the national government to the local systems of education in the several States. This is a wise measure, how wise none can appreciate but those who have studied deeply the nature of republican forms of government. Such governments cannot be maintained by large standing armies and powerful navies. These are the instruments of kings to protect despotic rule. School-masters are what a Republic needs, not soldiers. Spelling-books are the best defense of the nation. That Congress that votes millions for them will be wise beyond the age.

THE elaborate report of proceedings of the late session of the Lancaster County Institute, held about the middle of November, comprises sixty pages, same size and similar in style and make-up to the page of the *Pennsylvania School Journal*. It is the eleventh annual report of this Institute, all of them issued in this complete and permanent form, giving not only the proceedings of the Institute very fully presented, but also the name of each teacher, grade of certificate, school district, name of school, post-office address, length of school term, monthly salary and number of days allowed by the district for attendance at this annual convention of teachers. This report has long been one of the standard local publications of Lancaster County. Seventeen hundred copies were issued this year, fourteen hundred of which were distributed by mail a day or two before Christmas. We do not suppose that any other county in the United States will present an equally good Institute report for the year just closed, or make an equally creditable showing of similar reports for the past eleven years. In the hope that they may be of use

to teachers outside the limits of this county, the platform talks on Stars and Star Groups found here are transferred to the columns of *The Journal*. The entire series of these annual reports has been made by Mr. J. D. Pyott, also reporter for the Pennsylvania State Teachers' Association.

THE Councils of Philadelphia again propose to reduce the salaries of teachers. A reduction was made last year, and now the screws are to be applied to the rack a second time. It is in this way that cowardly councilmen make a little cheap reputation for economy. They are afraid to open their mouths in regard to the abuses that have nearly bankrupted their city, they close their eyes to the conduct of the men into whose deep pockets the city's treasures have been poured for years; in this direction the politicians stand guard; but the poor teachers may be buffeted about and "skinned" with impunity, and these brave councilmen are the men to do it! A leading city paper, speaking of the matter, says: "Thus far the greatest reduction has been made in the proposed appropriations for the schools, *which seem to be regarded as always affording a safe field for retrenchment.*" The sum of $15,000 a year is given without objection as salary to the District Attorney and $8,000 a year to his assistant, while the salaries of the teachers are cut down on the plea of economy, although on an average they scarcely exceed $500 a year. That generation may fairly boast of its civilization when this picture shall be reversed and district attorneys receive $500 and teachers $15,000.

THIS JOURNAL took the ground a year or two since, at the beginning of the Kindergarten agitation, that in the circumstances that now surround the public schools of this country it was impossible to ingraft the Kindergarten system upon our system of public instruction. Later, in opposition to this view, we were pointed to the Kindergartens established by the public school authorities of the cities of Boston and St. Louis. We answered then that these Kindergartens were simply an experiment, and that, even if successful, it would be found impracticable to so increase their number as to accommodate all the children of an age suitable to attend them. Now, we have no less an authority than the editor of the *Kindergarten Messenger* declaring that the public Kindergartens of Boston and St. Louis have either become or are fast becoming "pre-primary schools." This is precisely what might have been expected, and a few years more will find them completely merged in the primary schools. The result may be that children will be admitted into the public schools at an age somewhat younger than at present, but no one now living will see a system of public instruction so extended as to embrace all children over two years of age, as enthusiastic Kindergartners propose. Kindergartens will no doubt continue to flourish as special schools. We shall be glad to have them multiply, but long years must elapse before that can become a part of a general system of instruction.

OUR Canadian friends, both those of the Province of Quebec and those of the Province of Ontario, fared remarkably well at the Paris Exposition. In addition to numerous gold and silver medals and other marks of distinction which they received, notice the honors heaped upon their educational officials as stated in the following letter which we translate for the benefit of our readers. The gentlemen receiving the decorations named are all connected with the work of education:

PARIS, Nov. 15, 1878.

To the Hon. Gedeon Ouimet, D. C. L., Officer of Public Instruction.

SIR: I take pleasure in announcing to you that you have been raised to the rank of an Officer of Public Instruction by Monsieur A. Bardeux, Minister of Public Instruction in France. I am happy to inform you also that M. Chanveau and M. Doctor Milleur have received the same decoration. And last, your humble servant has been made an officer of the Academy for the services that they charitably supposed that he had been able to render as a member of the international jury.

The same number of decorations have been conferred upon the Province of Ontario. MM. Crooks, Ryerson and Hodgins have been made officers of Public Instruction, and M. Doctor May, my colleague in the jury, an officer of the Academy.

An Officer of Public Instruction is the highest grade. The decoration consists of palms of gold with violet rosettes. An Officer of the Academy has only a palm of silver with a violet ribbon. I am the bearer of your decoration, also of that of M. Chanveau and of M. Doctor Milleur.

Accept, Monsieur Superintendent, my congratulations, and at the same time my best wishes, and believe me,

Your very humble servant,

U. E. ARCHAMBAULT.

We learn with pleasure that the decoration of an Officer of Public Instruction was conferred upon Hon. John D. Philbrick, in charge of the educational exhibit of the United States, but we believe this high honor was reserved for him alone. Our Canadian friends, therefore, seem to be quite ahead of us.

NORMAL SCHOOL MUSEUMS.

THE most pressing duty before our Normal Schools just now is to free themselves from debt. The most rigid economy should be the rule of those who manage. Their expenses must be brought within their income, and a fund, larger or smaller, must be created to pay off debt. But once free from the incubus of debt that weighs down so many of them—and nothing will be more gratifying to us than to see them make an effort to thoroughly equip themselves for the important work—each of them should have:

1. *A Library.*—This should be supplied with the best books of science, art, literature, history, travels, etc. But above all it should be rich in works on pedagogy or teaching.

2. *A Collection of Apparatus.*—This should be full and of the best.

3. *A Museum.*—This need not be large, but it should be well selected and well classified. An hour spent in such a museum is worth more to a student than days or weeks with text books alone.

4. *A Pedagogical Museum.*—This should be a specialty. No effort should be spared here to represent the means and methods of instruction.

In this connection we are glad to help circulate the following from the Shippensburg School:

WE respectfully announce to all our friends, and especially to those in the Seventh Normal School District, that the Museum of the Shippensburg Normal School is open for the reception of gifts. Many of our friends have specimens of aboriginal antiquities, such as arrow-heads, spear-heads, and other stone implements; they have ores and other valuable minerals, and stones containing petrified remains of plants and animals; they have prepared animals, either in alcohol or stuffed and mounted; they have deer horns, birds' nests, wasps' nests, hornets' nests, and other curious things, which, after keeping awhile, they get tired of, and then throw away. All such, and other objects of natural history, are more valuable in a large collection where they can be compared together. We earnestly solicit donations of this kind. They will be placed on the shelves of our museum, duly labeled with the donors' names. This museum embraces all departments of Natural History and scientific apparatus, being one of the largest and richest collections in the country. It has been gathered at great expense, and during many years of exertion for the improvement of education; and our friends will aid the grand cause by forwarding or personally bringing their gifts, be they ever so small.

Editors of newspapers, who are always kindly disposed toward education, and who seldom miss an opportunity to help it along, will do good, we believe, by gratuitously republishing the above announcement.

The following specimens have lately been added to our museum by donors to whom our sincere thanks are due: a finely mounted bittern, *botaurus lentiginosus*, a bird of the heron family, about two feet high, by Mr. Geo. R. Dykeman. An excellent specimen of turkey buzzard, *cathartes aura*, by Dr. Hendricks, of Shippensburg, but now occupying a chair of anatomy in the Michigan University at Ann Arbor. It was shot and mounted by his own hands. The bird ranges from the Atlantic to the Pacific, and from our own latitude to the Gulf of Mexico. A dozen Indian arrowheads, and three quartz crystals, by Mr. J. B. Mateer. Rocks containing petrifactions of shells, by Mr. D. K. Wagner. Specimens of pipe iron ore and magnesian stone, by Mr. J. H. Cressler. A petrifaction, by Mr. A. T. Palm.

HIGH-SCHOOL GYMNASIUM.

THE members of the Lancaster Co. Institute, previous to adjournment of one of the morning sessions, were invited to visit the High School building, which, it was announced, would be open at 12 o'clock, with the boys in their gymnasium. A hundred or more teachers availed themselves of the opportunity of visiting this building, which, though not one of the largest is pronounced one of the finest, in the State. The rooms are attractive both in their furniture and other appointments; except that designed for the City Superintendent, which is yet vacant, but which will, it is hoped, soon be occupied by this essential functionary; for the Lancaster schools, in common with those of every other city in the State, need an official head.

Among the interesting features of the Boys' department, occupying the second floor, is their Centennial clock; a very substantial and handsome bank clock made by Howard & Co., of Boston, worth upwards of one hundred dollars, which hung for six months in the "Governor's Room" of the Massachusetts State Building on the Centennial grounds. It was secured for the school by Mr. McCaskey, the Principal, at the close of the Centennial, as a souvenir of the great Exposition of 1876, and will become more and more a historic time-piece as it quietly ticks away the years of the new century.

The High School gymnasium, which occupies the entire Mansard story, or third floor, is one of the very best departments of the school. It was well filled on this occasion, some sixty or seventy of the boys exercising on the apparatus, and a large number of teachers present as spectators, all of whom seemed much interested in the performance of the young gymnasts.

The apparatus comprises two arm swings, the low trapeze, eight ring ropes, climbing ropes, striking bags, two pairs of parallel bars, two pairs of climbing ladders, two raised ladders, one climbing pole, two pin posts, three vaulting bars of different heights, eight or ten pairs of dumb-bells, three or four pairs of Indian clubs, a set of boxing gloves, the regu-

lation horse, weight and pulley boxes, heavy beds to break the fall in leaping, etc., and a solid weight Health Lift of a thousand or more pounds of cast iron. The equipment of the gymnasium is very complete, worth from three hundred to four hundred dollars, and the grace of movement, strength and self-reliance, power and certainty of grip, which many of the boys manifest in performing what seem difficult and dangerous feats, were matters of surprise and gratification to all who found their way to this part of the building.

The lads have their captain and lieutenants, appointed at the opening of each session by the Principal of the school. These officers have entire control of the room, and they manage its affairs without occasion for inter ference on the part of the teachers, who regard the gymnasium as an invaluable factor in the school life of the boys—developing along with firmness of muscle no less firmness of will, fearlessness, manliness of tone, good-fellowship, and that force of character which makes men strong in other directions than such as are merely physical.

THE LEDGER AND INSTITUTES.

THE Philadelphia *Ledger*, both editorially and through its correspondents, has been lately engaged in discussing some of the phases of the Teachers' Institute question. We quote below a short editorial and a couple of letters on the subject, simply adding that none of the writers seem to be fully posted in regard to the matter of which they write. They appear to look at but one side of it. We shall take occasion soon to tell the whole story. First, we give the *Ledger's* editorial, introducing the subject:

"TEACHERS' INSTITUTES."—We have received some interesting correspondence with regard to Teachers' Institutes, concerning which, in their present activity, there seems to be some difference of opinion. One correspondent gives it as an impression that there has been, within the last five or ten years, a renewed life and spirit, which is probably the case in some districts. Another is of the opinion that the present activity shows a tendency rather "in the direction of sensation and entertainment, than of their original purpose of raising, by earnest work and earnest thought, the standard of education, both in the individual teacher and in the conception of the community." Still another, H. C. H., will find his remarks in regard to the early work of these Institutes amplified in a letter which, together with his own, will be found in the Correspondents' column.

SWARTHMORE ON INSTITUTES.

The entertaining article in Friday's *Ledger* in regard to the plan adopted at Swarthmore College for the normal training of teachers, is of much interest and suggestive value. The exact estimate to be made of the new policy cannot be determined until the graduates under this system take their place in the public schools, in competition and comparison with the graduates of our State Normal Schools. From that test neither side will be likely to shrink.

But the remark of your correspondent that county superintendents and common school teachers in Pennsylvania "are *beginning* to put life and interest into teachers' institutes," strikes me as an unguarded form of expression that the writer could hardly have intended, if familiar with the history, in our State, of the broad field of energetic and successful educational efforts. It would be as appropriate to say that Philadelphia, for instance, is "beginning" to take some interest in manufactures! The one remark would be as true as the other.

I need scarcely recall the fact to those familiar with the subject that for nearly a quarter of a century, the work of Teachers' Institutes has been carried on in this State with a zeal, efficiency and success, by county superintendents and teachers, with the help of the most competent and accomplished instructors in the State, or the United States, that has been of incalculable benefit to the common schools. This, of course, does not apply to Philadelphia, where they have yet to learn what a Teachers' Institute ought to be.

This work was carried on for years without a dollar of public appropriation from any source except in the county of Chester, the entire expense falling upon the poorly-paid but zealous and patriotic superintendents and teachers. The Institute work of these early years, in intense application, thoroughness, intelligence and zeal, was no whit behind the exercise of the present time. The history of that period is yet to be written, but this passing allusion to it may not be inappropriate now. H. C. H.

THE TEACHERS' INSTITUTES.

Mr. Editor: About the year 1850 there was an educational revival in Pennsylvania, which gave us not only Teachers' Institutes, but also the County Superintendency and the Normal Schools. The work of Horace Mann in Massachusetts and of D. P. Page in New York seems to have aroused the minds of teachers in different parts of this State, and efforts were made also simultaneously in different counties, to establish Teachers' Institutes. Professor F. A. Allen, of Mansfield, is said to have held, in 1848, at Columbus, in Warren county, the first Teachers' Institute in Pennsylvania. These societies were at first local, embracing only a few townships, which had been worked up by some live man; but soon, in many instances, were made county organizations. Washington county holds this year its twenty-eighth annual session, and very earnest work was done there in those early years. The Allegheny county Educational Association was also organized in 1850, and held monthly meetings. Their regular county Institute dates from 1854. Their Superintendent reports that the teachers themselves have, in years past, frequently contributed from three to five hundred dollars for lectures and instructors.

The oldest County Institute in Eastern Pennsylvania is that of Lancaster, and was first held in 1852. Our present State Superintendent, Dr. Wickersham, was one of the earliest and most earnest laborers in this county, as he had before been in his native county of Chester. The Millersville Normal School, the oldest in the State, grew out of a "Three Months' Institute," established by Dr. Wickersham in 1855, to aid

the teachers of Lancaster county, of which he was then Superintendent. County Snperintendents were first commissioned in this State in 1854. The Lancaster County Institute has always been one of the best, and a few weeks since the large court-room at Lancaster was packed to its platform at an institute meeting, to listen to Professor Wickersham upon his recent experiences and observations in Europe.

Chester county, under the leadership of Dr. Frank Taylor, and afterwards that of W. W. Woodruff (who during his nine years of superintendency, 1860-69, did most able and efficient work), became in Teachers' Institutes the banner county in the State, exerting a powerful influence in the improvement of other Institutes.

The Bucks County Institute was established in 1854, and has been, especially for the last eight or ten years, of great and increasing interest. Much of this progress was the result of the efforts of Hugh B. Eastburn, and since his resignation the work has been carried on by W. W. Woodruff, formerly of Chester.

Schuylkill county, under its Superintendent, Jesse Newlin, a Chester county man, has during late years, taken front rank in Institute work. Berks County Institute, conducted by Supt. S. A. Baer, an able educator, is one of the best in the State. County Institutes are sustained with much interest in Delaware, Montgomery, Fayette, Westmoreland and Susquehanna counties. There may be others quite as worthy, but my knowledge does not extend to all.

Phila., Dec. 5th. INDEX.

NEW METHOD OF TEACHING READING.

THERE seems to be some prospect that the method of teaching the art of reading invented by M. de Laffore, may before long be introduced generally in the primary schools of France. The accounts given of the efficiency and success of the method are something marvelous. It is said that M. de Laffore, a barrister practicing at Agen, came to Paris with his system already perfected as early as in 1827. The Society for the Improvement of Elementary Instruction appointed a commission to inquire into the system theoretically and practically; and a child brought before the commission for the purpose of being experimented upon was taught to read in twenty-eight hours. "This child," wrote M. Mignet, the historian, who reported on the subject, "did what seemed to the commission a marvel, for he read after so small a number of lessons words of all kinds taken at random in the first book that came to hand."

A second commission, formed by the Minister of Public Instruction, was next commissioned to examine M. Laffore's discovery. Several scientific men of eminence, such as Magendie and Letronne, were included in the Commission, which assisted at experiments quite as astonishing as those witnessed by the Society for the Improvement of Elementary Instruction. "Our first trial," wrote the secretary to the commission, "was made upon a servant of M. de Semonville's. This man, whose intelligence was very limited, and whose complete ignorance was attested by M. de Semonville, his master, received in our presence a lesson of one hour. He was brought to us again the following day, and received a lesson of four hours and a half. He was then able to read, in no matter what book, any word pointed out to him. He did so, it is true, slowly and with difficulty; but he read the words." Several experiments were made in the south of France, at Lyons, Valence, Marseilles, Toulon, Nimes, Montpellier, Agen, etc., and always with the same success.

"This method," said another official report on the subject, "which may be regarded as one of the finest inventions of the human mind, is worthy of the reception it has obtained. It teaches reading fifty times as quickly as the most rapid method now in use; and it gives skill in reading—so different from mere ability to read—ten times as quickly. It is to the diffusion of reading what printing was to that of books. . . . . It is impossible to calculate the rapidity with which elementary instruction may now be spread among the inferior classes."

It seems strange, as the *Pall Mall Gazette* observes in an article on the subject, that a method from which, so many years ago, so much was expected by the principal writers and scientific men of the period, should have been neglected until now, when M. Laffore's sons are endeavoring to get it generally adopted in the Government schools. But fifty years ago universal education in France, as in England, was looked upon with considerable distrust; and if M. Laffore's method had been adopted in the primary schools and made known throughout France, the art of reading would in a very short time have made immense progress. "If, however," says the *Journal des Débats*, in an article on M. Laffore's method, "reactionary passions interfered with the application of the system in our primary schools, they could not prevent its being appreciated and practised by a certain number of liberal-minded men, who took the same view of it which had been entertained in 1828." We trust that such considerations will no longer stand in the way of allowing a fair trial to a method which, unless the accounts of its efficiency have been greatly exaggerated, must be reckoned as among the most important contributions to the progress of education which this age has witnessed.

OFFICIAL DEPARTMENT.

FORTY-FIFTH ANNUAL REPORT.

DEPARTMENT OF PUBLIC INSTRUCTION,
HARRISBURG, January, 1879.

To the Senate and House of Representatives of the Commonwealth of Pennsylvania:

GENTLEMEN: As required by law, I herewith submit, for your consideration, the annual report of the Superintendent of Public Instruction. You will find it to contain: First, some observations and recommendations of my own, to which your attention is respectfully asked; second, a series of statistical tables, of much interest to all who desire to understand fully the growth and present condition of our system of public schools; third, the reports of the superintendents of the several counties and cities of the Commonwealth, and of the principals of the State Normal Schools, containing valuable matter relating to the interests of education in their special fields of work; and, finally, the detailed school statistics of the twenty-one hundred and eighty-seven districts into which our territory is now divided, including a summary of the whole.

PRESENT CONDITION OF THE SYSTEM.

A few figures will show the vast dimensions to which our system of public instruction has grown. During the past year, we had in operation eighteen thousand and sixty-seven schools, and the number of teachers employed was twenty thousand eight hundred and ninety-one. The interests of the schools are looked after by ninety-one superintendents, and fourteen thousand two hundred directors. The whole number of children in the State of school age cannot be less than one million two hundred thousand, and of these, nine hundred and thirty-six thousand seven hundred and eighty-six attended school in the year 1878. The cost of the system, not including the appropriations to normal and orphan schools, for the past year was $8,187,977.41, of which the State paid directly out of its own treasury $1,000,000. The value of our school property, as estimated by the directors in the several districts, is $24,839,820.61. A system like this should be able to produce results corresponding to the force employed, and the money expended in its work. Much of what it does for individuals, for society, for the State, for the Church, is necessarily intangible, and cannot be measured; but it is sufficient to say, that it has in charge nearly a million of children, and that the whole cost of what it does for them is only about *eight dollars apiece. Is it worth that much?* Does anybody doubt it? If so, let him ask the fathers and the mothers of the children, or the children themselves. My own conviction is, that it would be impossible to exchange our present system for another that would accomplish as much for the same amount of money.

HAS THE SYSTEM SHORT-COMINGS?

Certain short-comings of our system of public instruction have been pointed out in every report emanating from the Department since its organization. While some of them have been corrected, others still remain to mar the work. Indeed, no perfect system is possible in the present condition of society.

But while I am willing to acknowledge that the system has not accomplished all its most earnest friends could wish, I am far from agreeing that it should be held responsible for certain great evils that afflict the body politic. Crime is still committed, and our jails and penitentiaries are full of criminals, a majority of whom have attended public schools, and can read and write. But this proves nothing in opposition to our system of public instruction, for none of its friends ever claimed that the little learning these criminals generally possess could have much influence on their moral character. Then, the alleged growth of extravagance in office, large salaries, big fees, rich perquisites; the abuse of public and private trusts, dishonesty, defalcation, suspension, bankruptcy, the misappropriation of money; the prostitution of the ballot-box, cheating at elections, the purchase of votes; all this, and much more, has been laid at the door of the common school, and its friends have been called upon to show why it has not been able to root out of the very heart of society these monstrous evils that threaten destruction to our institutions. In answer to all this, I am willing to confess that we have, in our haste to make scholars in our public schools, overlooked to some extent the higher work of forming the character and cultivating the moral nature. Besides, the public schools are day schools, they are open in the State on an average only a little more than half the year, and their circumstances and surroundings are not always the most favorable to the operation of influences that quicken the conscience and ripen in the heart the seeds of good. Effective moral culture requires the continuous training of years. But if the public school must plead guilty to any part of this charge, the guilt must be shared alike with the home, the Church, the Sabbath-school, the press, the Government, and society itself. Any complaint against one of these agencies is unjust, without making it against all. "Let him who is without sin throw the first stone."

THE STATE APPROPRIATION.

By a provision in the new Constitution, the Legislature is required to appropriate annually, at least one million of dollars for the support of the public schools. The law requires this money to be distributed to the several districts in proportion to the number of taxables, and the State Superintendent is directed to draw his warrant on the State Treasurer for the same

as soon as certain conditions have been complied with. The custom has been for many years to make the appropriation a year in advance, and, then, as soon as the districts became entitled to receive their money, it was paid out promptly. It thus happened that the warrants for the appropriation were nearly all sent to the several districts during the months of June, July, August and September, the months immediately succeeding the close of the schoo year, and school directors arranged their financial affairs in expectation of getting their money at that time. By means, also, of these prompt payments the Department was enabled to secure prompt reports, to force backward districts to a full compliance with the law, and to exert a healthy control over the school affairs in all parts of the State.

It is greatly regretted that this policy could not be continued. Owing to a want of funds to pay them, the State Treasurer, for several years past, has asked for delay in the issue of the warrants to the school districts. The first year this was done, the delay asked for was very short; the next it was longer, and so on until, in 1877, some of these districts were compelled to wait for their money five or six months after it was due, and the city of Philadelphia is still entitled to an unpaid balance for that year of $120,000. The delay in the issue of the warrants for the present year is greater than ever before, the amount paid at this date, November 25, being only $300,000 out of the $1,000,000 appropriated. I need scarcely say that this financial irregularity is crippling the working of the whole system, and causing wide-spread dissatisfaction and complaint. The State Treasurer cannot pay out money not in his hands. The State Superintendent can issue the warrants, but to do so would only occasion disappointment and annoyance to school officers when there is no money in the treasury to pay them. The matter is one of serious concern, and I submit it to the Legislature in the hope that a way may be found to place the money in the treasury at the time the law requires it to be paid out for the great purpose named in the Constitution.

COUNTY SUPERINTENDENTS.

The act establishing the county superintendency was passed in 1854, and has consequently been in operation twenty-four years. The office was at first very unpopular, but its usefulness is now universally acknowledged except where men fill it who are incompetent for the place. Those acquainted with the history of common schools in Pennsylvania for the last quarter of a century, must accord to it the high honor of being the principal agency in the movement that has revolutionized our system of public instruction, making it one of the most efficient in the Union.

The Legislature of 1866 greatly strengthened the office by passing a law requiring all superintendents to be practical teachers, and to possess certain prescribed literary and professional qualifications. The law passed at the last session, fixing the salaries of superintendents, was greatly needed, and will be productive of much good. In particular cases it may operate somewhat unfairly; but it is fairness itself in comparison with the mode of fixing salaries under the old law. The salaries of superintendents are required to be paid, as heretofore, out of the general school fund, but the counties of Allegheny, Clarion, Elk, Lehigh, Schuylkill, Venango, and Warren, took advantage of the

Counties.	Number of schools...	Number of square miles.....	Salaries, as fixed by the triennial conventions in 1875...	Salaries, as paid out of the general State appropriation, under the act of 1875.....	Additions to salaries paid out of appropriations to counties.....
Adams	166	531	$1,000	$1,000 00	
Allegheny	395	757	2,000	1,777 50	$222 50
Armstrong	265	612	1,200	1,192 50	
Beaver	196	452	1,200	1,000 00	
Bedford	229	1,003	1,000	1,030 50	
Berks	434	900	1,800	1,953 00	
Blair	151	510	1,000	1,000 00	
Bradford	407	1,162	1,000	1,831 50	
Bucks	282	595	1,500	1,500 00	
Butler	260	814	1,000	1,170 00	
Cambria	218½	666	1,000	1,000 00	
Cameron	36	381	800	800 00	
Carbon	140	402	1,200	1,000 00	
Centre	216	1,227	1,000	1,500 00	
Chester	360	763	1,500	1,620 00	200 00
Clarion	220½	572	1,100	1,000 00	
Clearfield	212	1,130	1,000	1,000 00	
Clinton	117	857	1,000	1,000 00	
Columbia	181	179	1,200	1,000 00	
Crawford	383	1,005	1,350	1,723 50	
Cumberland	211	554	1,000	1,000 00	
Dauphin	221½	523	800	1,000 00	
Delaware	121	195	1,600	1,500 00	
Elk	67	774	1,000	800 00	400 00
Erie	301	772	1,000	1,500 00	
Fayette	247	830	1,000	1,111 50	
Forest	46½	431	500	800 00	
Franklin	268	756	1,000	1,206 00	
Fulton	71	442	1,000	800 00	
Greene	178	620	750	1,000 00	
Huntingdon	222½	899	1,000	1,001 25	
Indiana	244	828	1,000	1,098 00	
Jefferson	167	646	1,000	1,000 00	
Juniata	103	407	800	1,000 00	
Lackawanna*					
Lancaster	544	973	1,700	2,000 00	
Lawrence	139	376	1,200	1,000 00	
Lebanon	166	356	1,000	1,000 00	
Lehigh	243	364	1,300	1,093 50	206 50
Luzerne	596	1,350	2,000	2,000 00	
Lycoming	236	1,213	1,800	1,500 00	
McKean	104	1,007	1,200	1,000 00	
Mercer	302	666	1,500	1,500 00	
Mifflin	106	377	800	1,000 00	
Monroe	131	595	1,000	1,000 00	
Montgomery	299	484	1,200	1,500 00	
Montour	73	140	700	800 00	
Northampton	248½	382	1,200	1,118 25	
Northumberland	224	462	800	1,008 00	
Perry	180	476	700	1,000 00	
Pike	58	631	800	800 00	
Potter	133	1,071	800	1,000 00	
Schuylkill	443	840	2,250	1,993 50	6 50
Snyder	107	317	500	1,000 00	
Somerset	228	1,102	1,000	1,026 00	
Sullivan	57	840	800	800 00	
Susquehanna	300	317	1,200	1,500 00	
Tioga	291	1,124	1,250	1,500 00	
Union	88	315	900	800 00	
Venango	260	658	1,200	1,170 00	330 00
Warren	190½	914	1,000	1,000 00	200 00
Washington	302	889	1,000	1,500 00	
Wayne	213	747	1,200	1,000 00	
Westmoreland	363½	1,046	1,500	1,635 00	
Wyoming	110	403	800	1,000 00	
York	371½	921	1,200	1,671 75	
Total	.....	.....	$72,800	$77,831 25	$1,565 50

*Included in Luzerne.

provision in the law, permitting them to increase out of their own appropriations the salaries of their superintendents as fixed by the act. In the aggregate, the salaries paid the county superintendents this year is $6,596.75 greater than they were during the last term of the office; but probably this increase would have been exceeded if the matter had been still left in the hands of conventions of school boards. The table on preceding page shows the old salaries received by the superintendents in the several counties, together with the salaries as fixed by the act of 1878, according to number of schools, length of school term, and square miles of territory in each jurisdiction.

NORMAL SCHOOLS.

The general law relating to normal schools was passed in the year 1857. The county superintendency was established three years before, and there had grown up under its operation in many places a demand among teachers for a professional education. The effort to meet this demand resulted in the establishment at several favorable points, mostly under the direction of county superintendents, temporary schools for teachers, sometimes called normal institutes. The most noted of these was the one at Millersville, Lancaster county. The institute at Millersville proved a great success, attracting during the summers of 1855 and 1856, several hundred students, not only from Lancaster and adjoining counties, but from distant parts of the State. Its success was so great, indeed, that additional buildings were erected, and the temporary institute became a permanent normal school, with a faculty, an equipment, a course of study, a method and a life substantially as now after the lapse of twenty-three years.

From the first establishment of the common school system in the State, its far-seeing friends had held that the training of teachers in special schools adapted to the purpose was necessary in order to secure its success. Philadelphia had set the example by establishing, in 1818, her *model school*, expressly designed as a school for teachers; and nearly all the earlier State superintendents of common schools, in their reports, had called the attention of the Legislature to the necessity of establishing one or more institutions in which to train a body of teachers for the work of public instruction. The officers in charge of the School Department in the year 1857, inheriting, doubtless, these suggestions from their predecessors, and being themselves alive to the interests of the system, and urged thereto by some of the most progressive school men in the State, determined to make an effort to secure the passage of a law establishing and regulating normal schools. The law of 1857 was prepared, at their request, by Honorable Thomas H. Burrowes, of Lancaster. No one can read its provisions without seeing that they were designed in the main to accommodate themselves to the condition of affairs at Millersville, and to prompt the further development of similar efforts in other parts of the State. The law as passed provided for no State appropriations. The friends of normal schools proposed to apply to them the old Pennsylvania policy of allowing private enterprise to precede State action in the establishment of public institutions.

The normal school law received the signature of the Governor on the 20th of May, 1857. The trustees of the school at Millersville almost at once resolved to become a State normal school, under its provisions; but, owing to financial difficulties, their purpose was not carried out until 1859. Meantime similar enterprises had been undertaken in other parts of the State, and the school at Edinboro', Erie county, was recognized as a State normal school in 1861; the one at Mansfield, Tioga county, in 1862, and the one at Kutztown, Berks county, in 1866. These may be called the old schools. Then, came the new schools, the one at Bloomsburg, Columbia county, in 1869; the one at West Chester, Chester county, in 1871; the one at Shippensburg, Cumberland county, in 1873; the one at California, Washington county, in 1874, and the one at Indiana, Indiana county, in 1875. Several of these schools, however, owe their establishment more to legislative action than to any special effort made in their behalf by the friends of education.

The following statistics will show how large this normal school interest has grown. The whole number of students that have attended the normal schools since their foundation is 36,879, of whom 1,485 graduated. During the past year the number of students in all the normal schools was 3,245, and in the model schools attached to them, 1,910. The number graduated was 177. The value of the property owned by the several normal schools is estimated at $1,208,569.76, on which there is an aggregate debt due individuals of $273,621.96. The property is mortgaged to the State for $320,000.00. The total income of the schools during the past year, including the appropriations paid them by the State, was $429,718.52, and the total expenditures $365,311.10.

The State has dealt generously by the normal schools. Commencing in 1861, with an appropriation of $10,000, divided equally between the schools at Millersville and Edinboro', she has given them for buildings and equipment $520,000, $320,000 of which, as above stated, is secured by mortgages recorded in the name of the State, and placed for safe keeping in the vaults of the Treasury Department. In addition, the sum of $208,526.81 has been appropriated by the State to aid students preparing to teach in attending these schools.

The schools are managed by boards of eighteen trustees, two-thirds of whom are elected by the stockholders or contributors, and one-third is appointed by the Superintendent of Public Instruction. In all matters relating to finances, a measure can only be passed by a three-fourths vote, when the yeas and nays are called.

During the past year the course of study adopted for the normal schools was carefully revised, and as now arranged, I append it as a matter of public interest.

The course of instruction prepared for the State normal schools of Pennsylvania, and approved by the State authorities, is as follows:

ELEMENTARY COURSE.

A thorough knowledge of the branches taught in common schools, as required by law, including higher arithmetic and higher grammar; also

Geography.—Including the leading principles of Physical and Mathematical Geography.

Geometry.—Plane Geometry, including the circle.

Algebra.—As found in the elementary text-books.

Book-keeping.—Single entry, as found in the ordinary text-books, with the knowledge of the use of checks, notes, drafts, etc.

Physiology.—As found in larger school text-books.

Natural Philosophy.—As found in the ordinary text-books, with the use of apparatus.

Rhetoric.—Including the outlines of rhetoric.

English Classics.—Including only the elements.

Latin.—The elements, including First Book of Cæsar.

History U. S. and Constitution.—As in ordinary text-books.

Botany.—As in ordinary text-books.

Penmanship.—To be able to explain and teach some approved system, and the writing-books to be presented to the Board of Examiners.

Drawing.—As much as two of Bartholomew's drawing-books, with six months free-hand drawing.

Vocal Music.—Principles as found in ordinary text-books, and attendance upon daily exercises for at least one-third of a year.

Theory of Teaching.—This embraces three things:

1. A knowledge of the mental and moral powers, and the methods of training them.

2. A knowledge of the methods of teaching the different branches of study.

3. A knowledge of the methods of organizing and managing public schools.

Practice of Teaching.—This includes forty-five minutes daily practice in the Model School for one-half of school year, and two meetings each week for the discussion of the Practice of Teaching.

The *Theory of Teaching* must be commenced the second half of the Junior year, and continued during the entire course.

SCIENTIFIC COURSE.

Plane and Spherical Trigonometry and Surveying; Higher Algebra, as found in the ordinary text-books; Analytical Geometry and Calculus; Chemistry, as found in ordinary text-books; Natural Philosophy, as much as in Olmstead; Zoology, as found in Agassiz and Gould; Geology, as found in ordinary text-books; General History, as found in Weber and Wilson; Astronomy, as found in Loomis; Logic, as much as in Atwater; Mental and Moral Philosophy, as much as in Haven or Hickok; Elements of Latin, including four books of Cæsar; English Literature, as much as in Shaw, and the Study of English Classics for one-third of a school year; Theory of Teaching, as much as in the Elementary Course, and the whole of "Methods of Instruction."

Substitutions.—Pupils may be permitted to substitute for Spherical Trigonometry, Analytical Geometry, Calculus, the Mathematical parts of Natural Philosophy and Astronomy, and latter third of Higher Algebra—an equivalent amount of Latin, Greek, French or German.

MISCELLANEOUS PROVISIONS.

The School Year shall consist of forty-two weeks. Pupils, to graduate in a normal school must attend twenty-one weeks. Pupils applying for a diploma in any course must be examined in all the studies of that course. In each course a thesis must be written upon some educational subject. At examination, a paper stating that the candidates have completed the course of study for normal schools, have taught the required time in the model school, and have been examined and approved by the Faculty, shall be presented to the Board of Examiners. Papers for second diplomas must be presented to the Board of Examiners at their regular sessions.

Recommendations.—The students of the normal schools are recommended to study the Latin, French and German languages as far as practicable.

Arranging these studies under their appropriate heads, the two courses are as follows:

ELEMENTARY COURSE.

1. *Language.*—Orthography; Reading and Elocution; English Grammar; Composition; Outlines of Rhetoric and English Classics; Elements of Latin, including the First Book of Cæsar.

2. *Mathematics.*—Arithmetic; Elementary Algebra; Plane Geometry.

3. *Natural Science.*—Geography; Physiology; Natural Philosophy; Botany.

4. *History.*—History of the United States; Constitution of the United States.

5. *The Arts.*—Penmanship; Drawing; Vocal Music; Book-keeping.

6. *Professional Studies.*—School Economy; Methods of Instruction; Mental Philosophy.

7. *Practice of Teaching.*—Forty-five minutes daily practice in Model School for one-half of a school year.

SCIENTIFIC COURSE.

1. *Language.*—As in Elementary Course; English Composition; English Literature; Analysis of English Classics; Elements of Latin.

2. *Mathematics.*—As in Elementary Course; Higher Algebra; Trigonometry and Surveying; Analytical Geometry; Differential and Integral Calculus.

3. *Natural Science.*—As in Elementary Course; Geology; Chemistry; Zoology; Optics; Acoustics; Electricity and Galvanism; Analytical Mechanics; Astronomy.

4. *History.*—As in Elementary Course; General History.

5. *Arts.*—As in Elementary Course; Higher Culture in Vocal and Instrumental Music (voluntary).

6. *Professional Studies.*—As in Elementary Course; Mental Philosophy; Moral Philosophy; Logic; History of Education and the Philosophy of Education.

RECOMMENDATIONS RENEWED.

I hereby renew the recommendations of the last annual report on the following points, the reasons for which are therein fully given:

1. *As to the Revision of our School Laws.*—The laws relating to schools as they now exist in the statute books, are a mass of fragments without consistency or logical coherence. They need codification badly. The Legislature should authorize the doing of this work without delay. The coming year would be a proper time to have it done, inasmuch as the Department is required in any event to issue a new digest of the school laws.

2. *As to Furnishing Text-Books without Charge to the Pupils in the Public Schools.*—Boards of school directors are required to adopt books for the schools under their care, and to see that these and no others are used. But there is some doubt as to whether the law now authorizes them to furnish text-books to the pupils without charge, as they furnish globes, maps, charts, dictionaries. The plan of free text-books has so many advantages, and has worked so well wherever fairly tried, that I

have no hesitation in asking the Legislature to remove whatever uncertainty there may be with reference to the power of school boards in the premises.

3. *As to Children out of School.*—I have repeatedly called the attention of the Legislature to the fact that notwithstanding all that has been done to remove the evil of absenteeism in our schools, large numbers of children are growing up among us either without any education at all, or with so little that no possible good can result from it. The danger to our institutions from this source cannot be over-estimated. Ignorance is the worst enemy of republics. No question that will be likely to come before the Legislature can equal this in the importance of its consequences upon the future welfare of the State, and the happiness of the people. It is my purpose to prepare a bill covering the whole subject and lay it before the Legislature. I bespeak for its several provisions all the consideration they merit. The expense involved in the measure proposed will be an objection to it; but let it be remembered that ignorance is still more costly than education. Prisons and poor-houses are more expensive than schools. Any Government that has a thick, social under-stratum of the ignorant and vicious will be sorely taxed to pay police and soldiers. Schoolmasters will be found far cheaper, and, in the end, far more effective conservators of the peace.

FURTHER SUGGESTIONS.

1. *Building School Houses.*—Pennsylvania has expended annually for many years between one and two millions of dollars in building new school-houses. These houses are erected by boards of school directors, who can hardly be supposed to have made a study of the art of building structures of this character. As a matter of fact, many new school-houses are ill adapted to their purpose, without taste, and badly lighted, heated and ventilated. Much better ones could be erected with the same money. Indeed, it is no exaggeration to say that millions of dollars have been thrown away for want of more skill in school-house building.

In the most enlightened countries of the Old World, the government employs an architect, who prepares the plans for all grades of school-houses. These plans are worked out with great care, and embody the results of the largest experience in this depariment of architecture. All school-houses must be built in accordance with them, and hence the new school-houses in some parts of Europe are very much superior to ours.

Over twenty years ago, the Legislature authorized the preparation of a work on school architecture, and a volume on this subject was compiled by Honorable Thomas H. Burrowes, and published during the administration of Governor Pollock. This work did much good in its day; but the edition was long since exhausted, and, if otherwise, the book is now too antiquated to be well suited to our present wants. One of two things can be done: First, authorize the publication of a new work on school architecture, and require boards of directors to build their school-houses in accordance with some plan selected from it; or, second, enact a law providing that all plans for the erection of school-houses shall be submitted to some competent authority for approval, before work on them be commenced. Either will improve our school-houses, and save money for the people.

2. *Courses of Study.*—The question as to what we should teach in our schools, has received serious consideration throughout the whole country during the year, on the part both of school boards and teachers. Philadelphia and Boston have made almost radical changes in their courses of study for the public schools, and many other cities contemplate similar action. In our State, the superintendents have been making an earnest effort to provide more suitable work for the country and village schools, and wide-awake teachers and intelligent school boards have lent a willing ear to their recommendations. Indeed, the time seems to have come when steps towards reform in this important department of school economy can be taken judiciously.

For myself, I have been long convinced that the matter of instruction in our elementary schools is not as profitable as it might be made. A considerable portion of the ordinary text-books in geography might be omitted without loss. Tens of thousands of children are given lessons in arithmetic every day that they cannot possibly understand; and an immense amount of time is thrown away in the attempt to teach the principles of abstract grammar in primary schools. In general, the base of the knowledge imparted in our schools is not broad enough; little children are crammed with abstractions, definitions, formulas, and calculations that they cannot be made to comprehend, and the whole work of teaching is thus rendered dull, mechanical, and, too often, fruitless. And not only have we included in our courses of study much that might well be omitted, but we have omitted much that ought to be included. Little children are keen observers. They fairly revel in the world of nature; but our schools, for the most part, deny them lessons on objects, animals, plants, minerals, men, and confine them to the dry formal lessons of the text-books. A public school ought to be a powerful agency in the work of preparing its pupils to succeed in life, and yet the practical application of the branches taught is frequently overlooked, and drawing, the hand-maid of so many industries, receives little attention. The theory of our institutions is that all citizens may be made to understand the science and art of government, and, therefore, it is wise to intrust them with the right of suffrage, but what are we doing in our schools to instruct the young in the history and traditions of our country, its constitution and laws, the rights and duties of citizens? Then, back of all and more important than all, is the study of man himself, what he is physically, intellectually, morally; what he is in his

relations to his family, neighbors, country, mankind, nature, God. Would it not be well to have some lessons on a subject like this in exchange for the details of the geography of distant countries that will soon be forgotten or for certain half understood abstractions in grammar and arithmetic?

But it may be said that much of this knowledge, like the branches now taught, is too difficult for children. And this is true. if the lessons are made to consist merely of definitions and principles. Facts and inferences, however, are as simple in the field now outlined, as in any other, and it cannot be too often repeated, that it is mainly these that should constitute the matter of primary instruction. A further objection may be made to the proposed modification of the present course of study, on the ground that we have no suitable text-books on these subjects. Let it be answered, that the teacher should be the principal text-book in a primary school, and that until our teachers can give instruction out of their own full minds, no course of study, old or new, can produce its best fruit.

The reform now contemplated in the course of study of our public schools must be brought about, mainly, by those who administer the system, but it would be well for the Legislature to modify, as indicated, the branches now required by law to be taught in all schools under the control of the State.

3. *Closer Supervision.*—Further observation, both at home and abroad, confirms me in the opinion that close and intelligent supervision is the life of a system of schools. Nowhere in the whole world has there ever been a system that reached a high degree of efficiency without it.

Our system of supervision in Pennsylvania, embracing county, city, and borough superintendents, has accomplished a great amount of good in all departments of the work of public education; but in many of the country districts it operates at too great a distance from the schools and covers too much ground to be effective. Holland has probably the most effective system of school supervision in the world, and there the district inspectors have within their jurisdiction, on an average, only forty schools, with five thousand three hundred and nineteen pupils and one hundred and twenty-two teachers; and, besides, they are greatly aided in their work by their superior officers, the provincial inspectors.

My purpose, however, in bringing the matter before the Legislature at this time is not to ask for any radical change in our general system of school supervision, but to suggest that it might be proper to extend somewhat the power already possessed by boards of directors in the matter of the appointment of local superintendents of schools. The secretary of a school board can now be appointed district superintendent, and given full authority to visit the schools. It has been held that a qualified person outside of the board can be appointed and required to perform similar service within the district. Both of these plans have been tried in many districts throughout the State, and, wherever the right man was selected for the office, with marked success. But the inspector of schools should always be a practical teacher, of acknowledged skill, and our districts are generally too small to give such a person regular employment or to pay him adequately. If the Legislature would pass a law giving school districts power to combine, with proper restrictions, for the purposes of supervision, local superintendents could be chosen from among the teachers, subject to the approval of the county superintendent, who would in a short time double the efficiency of the schools. Such officers, too, in addition to their more strictly professional duties, could, as agents of the board, hunt up the children not in school, look after the school property, provide the school supplies, and attend to the clerical work of the several boards by whom they might be employed.

4. *The Labor Question.*—A report like this is not the place in which to discuss, in a general way, the great question of labor, but there are a few things concerning that question that it seems proper to say. A system of public instruction, in a broad sense, aims not only to make men better and more useful in the sphere in which it finds them, but, if possible, to lift them up to a higher one. It is the special aim of such a system, as I understand its functions, to reach its hand down to the homes of the poorest and lowliest among us, and proffer help to those who toil on our farms, or in our shops, furnaces, forests and mines—help in the shape of increased skill, better taste, more enlarged views, purer pleasures and in an inspiration that longs and strives for something higher and nobler.

There is no way by which working men, as a class, are so likely to improve their condition as by increasing their knowledge. Knowledge is the foundation of skill, and knowledge and skill combined bring better opportunities for work, higher wages, and more honorable position in society. In addition, a rightly directed education inculcates habits of industry, economy, sobriety, and instills the deeper principles of honor and honesty; and these, it is universally acknowledged, lie at the foundation of all true success in life. Working men, in no part of the world, ever made themselves better off by making war upon other classes of society, by violent strikes for higher wages, by the destruction of property, by carrying into effect those communistic theories, which threaten a political revolution that would end in universal anarchy. It must be admitted, however, that labor has not been fairly treated, that men were not born to be mere beasts of burden, that a reform is imperatively demanded, that will alleviate the poverty and distress prevailing among the working classes; and here, I take it, is a field in which a system of public instruction has an opportunity of showing its power as an agency organized in the interest of humanity. To give practical direction to the work, let me ask the assistance of the Legislature, and the school officers throughout the State, in perfecting such measures as seem best calculated

to promote the end in view. Much can be done in the line of the following suggestions:

Many children remain away from school on account of a want of books or proper clothing. Certainly, these can be provided in some way.

For children who are compelled to remain out of the ordinary schools to work, night schools or half-time schools can be established.

Industrial or trade schools, such as have been established in large numbers in Europe, seem to be almost a necessity for the working classes.

Good results could not fail to flow from making known, in some systematic way, to those most concerned, the value of education in its relations to labor.

EUROPEAN TOUR.

Anxious to see the Old World, and to acquaint myself more fully concerning its educational institutions and systems, I left New York on the 22d of June, for the purpose of visiting the international exposition at Paris and several countries in Europe, and landed there, on my return, on 22d of October, having been absent just four months. My tour extended through Scotland, England, Ireland, Wales, Belgium, Switzerland, Italy, Austria, Germany, Holland and France. Some two weeks were spent in London, three weeks in Paris, and from three to five days each in and near the cities of Rome, Munich, Dresden, Vienna and Berlin. Shorter visits were paid to Glasgow, Edinburgh, Dublin, Antwerp, Brussels, Cologne, Heidelburg, Zurich, Lucerne, Lausanne, Berne, Geneva, Turin, Genoa, Florence, Venice, Milan, Saltzburg, Prague, Leipsig, Amsterdam, La Hague, Rotterdam, and other interesting cities and towns.

The main object of the tour was to make observations and gather information concerning the work of education in the old World. Previous to starting, his Excellency, Governor Hartranft, had honored me with an appointment, constituting me "a commissioner, in the name and for the benefit of the Commonwealth, with full power and authority to inquire into and examine the industrials schools and systems of general and technical education in the various countries of Europe," and commending me "to the especial confidence and courtesy of foreign Governments, and those in authority under the same." General Eaton, of the United States Bureau of Education, at Washington, had also kindly furnished me with letters of introduction to leading friends of education, and educational officials in different countries. With these documents, I enjoyed peculiar advantages for prosecuting the object of my visit, the only drawback met with being that the schools, were at the time, in many places, closed for their summer vacation.

I regret that in the present report I am unable to present in full detail the fruits of the tour. Careful notes were taken everywhere, especially in the educational departments of the exposition at Paris. Books, documents, copies of laws, courses of study, etc., thought to be of value were collected in considerable quantities, and brought home for use. But to translate, digest, and arrange the material thus collected, and to set in proper order the conclusions to be drawn from it, would require several months of hard work, and the interval between my return and the time this report must go to press is much too short in which to perform it. The subject will be just as fresh and interesting in another year as now, and I hope, then, to be able to lay before the Legislature and the school men of Pennsylvania, a full account of what I saw and learned concerning education in the several countries of Europe which I visited. At present, I am compelled to content myself with the barest outline.

HIGHER EDUCATION IN EUROPE.

Universities in Europe, especially on the continent, differ very greatly from universities in the United States. They are differently organized, are more under the control of the Government, and aim, in the main, at the accomplishment of a different object. Their methods of instruction and discipline are different, and their internal life has characteristics of its own, not met with in institutions of the kind in this country. I visited the universities at Edinburgh, in Scotland; Dublin, in Ireland; Oxford, in England; Heidelburg, Munich, and Berlin, in Germany; Prague and Vienna, in Austria; and Zurich and Berne, in Switzerland. At some of them I was only able to take a look at the buildings and grounds; but at others, I enjoyed the privilege of inspecting chapels, lecture-rooms, museums, apparatus, and programmes of subjects taught, and of attending the lectures of the professors. At several of them, I met American students, who were of great assistance to me.

In a general way the buildings of a European university are substantial, but plain and old-fashioned. The lecture-rooms are in many cases provided with pulpits or professors' desks, tables, and benches of the most antiquated style. There are everywhere four faculties, the theological, juristical, medical and philosophical. The professors do not seem to rely very much upon graphical illustration to enforce their instruction; and, hence, outside of the departments of natural sciences, one sees but little apparatus. The teaching is all done by lectures. The great purpose aimed at is to open up new fields of thought or to find something new in old ones. The students take notes of what is said, and before obtaining a degree are compelled to undergo an examination. No text-books are used, and I saw nothing like the recitations of the American schools. A professor sometimes holds private conversations at his house or rooms with the students who attend his lectures, and these seem to be very profitable and highly appreciated. The students are at liberty to attend such lectures as they please, and, even when matriculated, no one in authority appears to concern himself as to whether they are attentive to their duties or not. The discipline of one of these universities seems very lax, and I was told that it was customary to leave the graver offenses of the students to

be dealt with by the municipal authorities. A European university is strictly a State institution. The government virtually appoints all its professors, and supplies it with the necessary funds for its support so far as it is not self-supporting. A university education is a pre-requisite for entering a learned profession or any of the leading positions in the civil service of the country.

I cannot but think that European universities exert much more influence upon the social condition of the people, are a much more important factor in the civilization of the age, than is the case with higher institutions of learning in America. This arises from several causes; from their relation to the State and the learned professions, from the fact that their professors constitute a body of the greatest thinkers in the world, and from their large attendance and the class of men who attend them. In Germany alone there are twenty universities, with about eighteen hundred professors and over twenty thousand students. It is calculated that about one in every twenty-six hundred of the whole population takes a university course. And, when it is remembered, that to be admitted to one of these universities a student must possess acquirements about equal to those of the graduates of our colleges, the influence of such a body of learned men can be appreciated.

SECONDARY EDUCATION.

Secondary education, as understood in Europe, embraces the education that lies between the university on the one side and the elementary school on the other. Applied here, it would include, I take it, all that is taught in our best high schools and academies, and about all that is embraced in the courses of our colleges. This grade of education is represented abroad by such institutions as the famous high school at Edinburgh, the great public schools of England, the gymnasia, the progymnasia, the Real Schule and the higher burgher schools of Germany, Austria, etc., and the communal colleges and lyceums of France. It was my good fortune to be able to visit personally a considerable number of this class of schools both in Great Britain and on the continent, and to study the exhibits of many more at the Paris exposition.

Omitting all details, the things to be remarked concerning the class of institutions established in Europe for the purpose of providing for secondary education are the following:

Their Relation to the Universities. — The gymnasia in the German speaking nations, and similar institutions under other names elsewhere, are preparatory schools to the universities. The progymnasia prepare students for the gymnasia, the Real Schule for the polytechnic schools or for practical business.

Their Relation to the Government.—Institutions of a secondary class of all grades are subject to inspection by government officers. The faculties of many of them are appointed by the minister of public instruction who, also, prescribes their course of study. Large subsidies are granted them every year from the public treasury. In addition to those established and supported by the government at large, many municipalities have schools of their own for secondary instruction.

Their Number.—Nowhere is our system of public instruction more weak than in the matter of secondary instruction. While the most enlightened nations of the Old World spare no effort or expense to fill up the gap between their elementary schools, and their universities with a body of secondary schools sufficient in number, and admirably adapted to the purpose, there are those among us who would lay violent hands on our high schools, and limit the work of public instruction to the mere teaching of reading, writing and arithmetic.

A few figures will show to what extent secondary education has been developed in several European countries. The figures are taken, with some exceptions, from the report of this department for 1876, no later ones being at hand.

Germany.—Population 41,000,000; secondary schools for boys, 1,043, with 12,000 teachers, and 177,379 students. In the German Empire, one person in every 377 of population receives a classical, and one in every 468, a non-classical secondary education.

Prussia, apart from the rest of Germany.—Population, 25,000,000; secondary education, 90 higher burgher schools, with 802 teachers, and 15,971 students; 96 Real Schule, with 1,711 teachers, and 38,135 students; 261 gymnasia, with 4,009 teachers, and 78,506 students; 215 higher female schools, with 2,206 teachers, and 43,247 students.

Austria.—Population, 36,000,000; secondary schools for boys, 205, with 3,307 teachers, and 49,280 students.

Italy.— Population, 27,000,000; secondary schools for both sexes, 383; students, 18,852.

Netherlands.—Population, 3,674,402; secondary schools, 219; teachers, 1,390; students, 14,500.

Sweden.— Population, 4,250,452; secondary schools, 103; students, 11,874.

Switzerland.—Population, 2,669,147; secondary schools, 375; teachers, 1,000; students, 12,750.

France.—Population, 40,000,000; secondary schools, 1,259, with 144,085 students.

ELEMENTARY EDUCATION.

The question of elementary education attracts great attention at the present time in every country in Europe. Philosophers are busy working out the unsolved problems connected with human culture and development. Statesmen are considering the ways and means of increasing national strength and prosperity by making education universal, and teachers are discussing courses of study, and methods of imparting instruction. Within the last few years, great progress has been made in establishing and improving systems of elementary

schools, and the future, in this respect, is full of promise.

During my tour, I saw large numbers of city, village, and country schools of the lower grades; and at the Paris exposition the opportunities were all that could be desired for inquiring into systems of education, their administration, and the practical working of schools. An account, in detail, of what was learned must be postponed for the present; but some general conclusions may be stated.

First, let me mention a few particulars, in which, I think, the elementary schools of the nations of Europe, educationally the most advanced, are superior to ours.

1. *They are more carefully inspected.*—The local school officers seem to be generally selected with reference to their qualifications for the place, and the inspectors are specially prepared for their work. They have fewer schools to look after than our superintendents. Their tenure of office is for life, or good behavior, and they are held to a strict accountability by superior officers.

2. *Their course of study is better.*—They do not have so much abstract grammar or arithmetic in their schools, or so much detailed geography; but, in place of these branches, they have drawing, vocal music, and the elements of the natural sciences. Many of them make special application of the natural sciences to agriculture, horticulture, and domestic economy. More teaching is done without the text-book.

3. *Their terms are longer,*—The schools are almost everywhere open for nine or ten months in the year.

4. *The teachers have made more special preparation for their work.*—They are, for the most part, either graduates of normal schools, or they have served an apprenticeship as pupil teachers, in a school under the direction of a master of acknowledged skill. As a class, they are more learned than American teachers. They have, also, whatever advantages arise from constant employment, and a permanent situation.

5. *More attention is paid to moral and religious instruction.*—The teachers of the elementary schools as a class seem to be professors of religion. Religion as a branch of study is found upon almost every school programme. Under this head lessons are given in the Scriptures, and in the doctrines of the Church to which the pupils or their parents belong. Intermingled with this intellectual religious instruction, there is much done to develop the religious life. A devotional feeling prevails in many of the schools that is very rare in America.

Some of the particulars in which our elementary schools excel those I saw in the Old World are the following:

1. *We have better school-houses.*—This is true only in a general way of village and country school-houses. I saw school-houses in Berlin, Vienna, and other cities in Europe equal to the best we have in this country. Under the policy lately adopted by some States, of requiring all school-houses to be erected according to plans furnished by a skillful architect employed by the Government, those recently built are admirable in all respects. But as a whole there there is no country in Europe whose school-houses will compare in size and general adaptation to their purpose with those in Pennsylvania.

2. *Our school furniture is superior.*—Several European nations had exhibits of school furniture at Philadelphia. It was acknowledged on all hands that none of them compared in excellence with the furniture shown by American manufacturers. A like superiority was accorded to our school desks and chair at Paris. In a majority of the country schools all over Europe, the pupils sit on long clumsy benches, and write on long clumsy desks, similar to those in the schools of Pennsylvania a half a century ago. Black-boards are in the schools; but they are generally small, and seem to be used mainly by the teachers. I did not see a class of pupils working at a black-board in a single school I visited.

3. *Our text-books are better.*—I speak of text-books for elementary schools, and I risk nothing in saying that they are better than those of any country in Europe in matter, in arrangement, in method, in attractiveness—in all that goes to make up a good text-book for children of from six to twelve years of age. I do not believe that a single teacher, competent to compare the merits of text-books, who examined the several exhibits of this kind at Paris, could have come to any other conclusion.

4. *Our schools are free*—There are no free schools in Europe, except in some parts of Switzerland. All children who attend school, not on the poor list, must pay a fee. A child whose parents are unable to pay the fee can be exempted from it; but this in Europe, as well as in America, is to put a mark upon him.

5. *Our teachers have more tact.*—I have admitted that European teachers are, as a body, more learned than ours. They have made more special preparation for their work. But if my observations are at all reliable they do not evince that natural aptness as instructors of the young, which is characteristic of American teachers. They seem to be too heavy, too slow, wanting in versatility of talent, in mental flexibility and ready sympathy. They appear to teach under some restraint, and to be unable to forget themselves and the outside world in an effort to make not only scholars, but men and women, of the children placed in their charge.

6. *More is done in our schools to form character.*—American schools are defective in the effort they make to form the character of the young, but with all their defects, they form a happy contrast with European schools in this respect. The highest aim of the average teacher of a country school in Europe seems to be to impart to his scholars such knowledge as will be useful to them in the sphere of life in which

they were born. This instruction contains no element prompting them to make an effort to rise to a higher one, none teaching the great doctrine of human equality or evoking a self-reliant, independent executive power. In America the school is a social force, always moving upward; in Europe it is a social force moving on a horizontal plane. Here, the effort is made to prompt inquiry in all directions, to promote free discussion, to encourage criticism, to accept nothing that is bad because it is high, and to despise nothing that is good because it is low, and to implant in the breast of every child an abiding faith that God had made him the peer of any man, and that it is lawful for him to aspire to the highest place on earth; there, the children of the poor, who alone, as a rule, attend the public schools in the rural districts, are taught to be content with their condition, to follow quietly the avocations of their fathers, to accept as right all that is done by their rulers, to repress all longings for something higher and nobler, and to live and die as generations of their ancestors have lived and died for hundreds of years.

It was a surprise to me to see how little the public school systems of the Old World have uplifted the aspirations or ameliorated the condition of the common people. Doubtless a large majority of the children in the most enlightened countries are taught to read and write; but the houses of the poor, their food, their dress, their mode of life, the amount and character of their toil, are to-day what they have been for many generations. If the efficiency of a public school system is to be tested by its ability to reach its hand down to the lower strata of society and elevate and ennoble, my observations must be greatly at fault if many of the European systems most praised are not comparative failures. Of what avail, for example, is a little reading and writing to the millions of peasant women and girls who are compelled to do most of the work of the fields, as well as all that of the house, to carry heavy loads, to drag heavy carts—to make themselves in good part beasts of burden? A public school system may be an instrument in the hands of a despotic Government to make obedient subjects, good soldiers, efficient machines; but when so used an American cannot be expected to look upon it with much favor, although he may admire it as an organization. The truth is that the social and political systems of the Old World and the New are so different, their ideas and aspirations are so far apart, that the only common standard that can be applied to the schools of both is that one applies only to their outside—their mere mechanism; all that is vital concerning them must stand or fall with the peculiar institutions and customs among which they were established and under whose influence they have grown up

NORMAL SCHOOLS.

There are normal schools, or teachers' seminaries, as they are called, in all the countries of Europe. They are everywhere considered to be a necessary auxiliary to a system of public education. I visited several of these schools at different places, and at the Paris exposition, I had opportunities of gathering much information concerning their organization and management. The first school of the kind was established in Germany, nearly two hundred years ago, and it is in that country now that they are most numerous and flourishing. This sketch will be limited to a brief account of the most striking characteristics of the German normal schools.

There are two classes of normal schools in Germany. The first prepares teachers for the elementary schools, and the second, for the secondary schools. Of the first class, there were, in 1877, one hundred and sixty-eight, with twelve hundred and nine teachers, and twelve thousand six hundred and forty-three students. Of the second class, there were only eight or ten, but lectures to those who desire to prepare for teaching are delivered in all the universities.

The buildings are all plain. Many of them were erected by municipalities, corporations, or individuals, but all of them are endowed and regulated by the State. Some of them possess, in addition, private endowments.

The instruction is always gratuitous, and in many of the schools provision is made to pay a portion, sometimes as much as one-half, of the living expenses of the students. The charges for boarding are everywhere very low. All students agree to teach three years, after leaving school, wherever placed by the proper authorities.

The students at about three-fourths of the schools board and lodge in the school buildings.

None are admitted as students who do not intend to teach. All must be at least seventeen years of age, and pass through an entrance examination in about what we call a common school course. Great care is taken to see that they possess proper moral qualifications to become instructors of the young. The course is three years, and the final examination is by government officials. The number of students admitted into one school very seldom exceeds one hundred.

Model schools, or schools of practice, are connected with all the normal schools, and the teacher students are required to spend therein, engaged in learning the work of practical teaching, some hours every day during their last school year.

The policy of the Government is to place some teacher of known ability at the head of each normal school, and intrust to him its whole organization and management. It is made his duty also to visit the schools of the district for which he is expected to furnish teachers that he may acquaint himself with their character and wants.

The branches taught in the normal schools are about the same as with us, but much more attention is given to pedagogy, or the science

of teaching. The students, in many cases, do house-work, prepare meals, aad work in the gardens and on the farms attached to the schools. In addition to this, here and there, they do some shop-work. The female students, although their numbers are small in the normal schools of Germany, learn sewing, knitting, cutting-out, etc.

To show in what favor normal schools are held in the Old World, it may be stated that there were, by the latest statistics at hand, in Austria and Hungary, 127 of these schools; in France, 86; in Italy, 115; in Russia, 45; in Sweden, 10; in England, 41; in Belgium, 33; in Spain, 31, and in Switzerland, 32.

INDUSTRIAL EDUCATION.

Convinced beforehand that America had most to learn from Europe on the question of industrial education, I tried to improve all the opportunities my tour gave me in gathering information on this subject. In former reports reasons were given, at some length, in favor of some modification of our system of public instruction, that would make better provision for the education of our young people who are to engage in the several arts and trades. Some of these reasons may be here summarized:

1. Industrial schools are needed to supply the place of the old apprentice system, which has almost become a thing of the past.

2. They would open the way for the employment of the young, who now for want of something to do, contract habits of idleness and vice. A large proportion of the crime of the country, as shown by the statistics of our prisons, is committed by young men without trades.

3. They would vastly increase the knowledge and skill of workmen, and this would lead to the development of new and profitable industries.

4. They would enhance the value and increase the productive power of manual labor. In no other way can the laboring classes be so substantially benefited.

5. They would develop the mechanical and art talent of the nation, and convert the artisan into an artist.

The agencies co-operating in the work of industrial education in Europe may be divided into the following classes: 1, The great polytechnic schools; 2, museums and schools of industrial art; 3, schools for special trades; 4, schools for general apprenticeship; 5, industrial departments in connection with public schools. Enough will be said of each class to characterize it. Full details must be left until another occasion.

THE GREAT POLYTECHNIC SCHOOLS.

I visited those at Zurich, Munich, Vienna, Prague, Dresden, Berlin and Paris. Their object is the same, that of imparting a thorough scientific and practical education. All of them are partially supported by the State, have large and able faculties, and are fully equipped in all respects for the work they have in hand. Most of them are well supplied with philosophical apparatus, have rich and well-arranged scientific collections, industrial museums, art galleries and botanic gardens. Several have suits of shops, in which the students are required to do a certain amount of actual work. Others think they obtain better practical results by allowing their students to visit at stated times, with their instructors, the mills and manufactories of the vicinity, where privileges of observation and sometimes of work have been obtained for them. I need scarcely add, that we have no institutions of the kind in America that will compare, in any respect, with the great schools to which I have referred.

MUSEUMS AND SCHOOLS OF INDUSTRIAL ART.

I spent many delighted and profitable hours in the Industrial Museum of Scotland, at Edinburgh; the South Kensington Museum, at London; the Museum of Art and Industry, at Vienna; the National Bavarian Museum, at Munich; the German Industrial Museum, at Berlin, and the Conservatoire des Arts et Metiers, at Paris. These museums differ somewhat in the character of their collections, and in the facilities they offer for instruction, but they all have in view the same object, that of promoting art and industry. In connection with some of them there are courses of lectures, schools of art, laboratories, and work-shops. The collections at all of them are large, rich, and admirably arranged for the purposes of instruction. The South Kensington Museum possesses the most complete collections of objects of industrial art, modern and retrospective, but all of them possess thousands of specimens full of interest to the farmer, miner, manufacturer, mechanic, merchant, artist,—to all, indeed, who have any disposition to profit by evidences of human skill and industry. To indicate in some measure the character of the collections at these museums, I will name the headings of the several divisions of the industrial department of the museum at Edinburgh, as they appear miscellaneously in the catalogue: 1. Decorative furniture. 2. Architectural and engineering models, etc. 3. Arms, including shot and shell. 4. Light-house models and apparatus. 5. Building materials. 6. Metallurgical specimens. 7. Mining and metallurgical models. 8. Metal work, processes of manufacture, etc. 9. Manufacture of pottery. 10. Manufacture of glass. 11. Varieties and applications of carbon. 12. Coal, shales, peat, etc. 13. Ancient and modern glass. 14. Pottery and porcelain. 15. Majolica ware. 16. Chinese and Japanese collection. 17. Objects of industrial art from India, Turkey, Greece, Italy, France, Spain, etc. 18. Hats and bonnets. 19. Manufactures from horn and bristles. 20. Substitutes for animal bristles. 21. Leather, horn. 22. Woolen fabrics. 23. Hair, feather, etc. 24. Quills, bones, ivory. 25. Worsted. 26. Silk manufactures. 27. Cotton manufactures. 28. Calico printing. 29. Flax, jute, hemp. 30. Vegetable fibers. 31. India rubber, gutta

percha. 32. Buttons, lace, poplins, etc. 33. Food collections, embracing the articles used for food in all parts of the world. 34. Raw products. 35. Philosophical instruments. 36. Chemical specimens. 37. Materia medica. 38. Woods. 39. Building stones. 40. Educational collection. 41. Paper and its applications. 42. Mechanical models. 43. Agricultural collection. 44. Models of farm-houses, barns, outbuildings and agricultural machinery.

A writer on the subject of industrial museums, says: "With well-stored museums, easy of access at all times, the workman can use his eyes to the greatest advantage in perfecting his technical education. Through the eye is the readiest approach to the mind. Frequently a single glance of the eye will give the workman a clearer comprehension of a principle in mechanics, than he could obtain from a long explanatory discourse, or from reading a book. Then it has been well said that 'taste is the recollection of the beautiful.' Whether this definition be true or not, certain it is, that for the cultivation of the taste, which is so valuable in nearly all industrial arts, there must be beautiful objects for frequent contemplation and study. This lacking, all other instruction fails to impart correct taste."

SCHOOLS FOR SPECIAL TRADES.

These schools are very numerous in all European countries. There are over fifty of them in Belgium, more than a hundred in Switzerland, nearly fifteen hundred in Germany, and probably one thousand each in Austria and France. Their object is to prepare skilled workmen for particular trades. The branches of instruction pursued in the elementary schools are sometimes taught in them, but, in a general way, a certain amount of knowledge is required for admission, and then they confine themselves strictly to that course of theoretical and practical instruction deemed best for the special object in view. Among these schools are some supported wholly by the State, others by municipalities, and still others by corporations or individuals. Belonging to this class may be mentioned the schools of agriculture, horticulture, forestry, mines, commerce, navigation, building, etc. Also, the still more special schools for teaching weaving, watch-making, wood-carving, stone-cutting, lace-making, sewing, printing, dyeing, jewel-cutting, straw-plaiting, and work in bronze, ivory, glass, clay, etc. This kind of instruction appears very novel to an American, but the whole system is deeply interesting. Many of these schools were represented at the Paris exposition, and attracted much attention. A brief description of one or two of them is all that can be attempted here.

The industrial school for weaving, at Ghent, Belgium, was established in 1825, and its length of years is therefore a test of its merit and success. We take the following account of it from the report of the commissioner of education for 1870:

"The practical instruction in the technology and designing of weaving is given in two sections or classes. The first of these classes has for its object the making of designs for carpets, paper-hangings, cotton prints, foulards, shawls, laces, embroidery, and all kinds of figured and damask stuffs. The pupil who completes his studies in it is in a position to occupy himself profitably in all the applications of the art of design to those different branches of industry.

"The class of technology and weaving comprises instruction in (1) all preliminary operations of weaving, such as winding the bobbins, preparing, mounting, and rolling up the warp; (2) the apparatus employed in these operations, for hand-loom as well as for power-loom weaving; (3) the preparation of the weft, winding on bobbins and on spools, dressing, and the necessary apparatus for this; (4) all the parts of the ordinary loom; (5) interlacing the threads; (6) looms for plain weaving; (7) the little Jacquard, called the draw loom; (8) the Jacquard apparatus; (9) raised weaving; (10) the arrangements of the cards; (11) the setting of the patterns, and the apparatus necessary for this operation; (12) the weaving of damasks, dimity, figured stuff, chines, velvets, &c; (13) the power-loom. Examples are given of calculations for the manufacture, and the course closes by the statement of some finishing processes. In weaving, the pupils perform all the operations, from the design to its execution in the loom. They analyze and reproduce themselves in woven fabrics all kinds of specimens of stuffs, from the most simple to the most complicated. They acquire, thus, a complete and minute knowledge of everything relating to the production of textile fabrics; those made by plain weaving as well as those made by the Jacquard apparatus."

One of the many schools for watch-making in Europe is at Besancon, France. The course is three years, and arranged into three divisions, as follows:

FIRST YEAR—*Practical Course.*—Filing, turning, hardening, and tempering metal, perfecting small tools for doing first halves of the ordinary sizes.

Theoretical Course.—Revision of early education, arithmetic, mensuration, geography, mechanical drawing, general principles relating to the more simple tools and machines employed in watch-making.

SECOND YEAR—*Practical Course.*—Doing first halves of various sizes, pivoting, and making the different parts of a cylinder escapement.

Theoretical Course.—Studying style, geography, arithmetic, elementary geometry and its application, mechanical drawing, geometrical models of tools and machines used in watch-making, designs of the different parts of a watch.

THIRD YEAR—*Practical Course.*—Constructing and planting the escapement, examining, regulating.

Theoretical Course.—Course of mechanics, industrial chemistry, cosmography, book-keeping, mechanical drawing, study of various cut-wheels, models of escapements, and designing watch movements for the model.

What has been said above will serve to illustrate the principles underlying the system of trade schools and their practical operation.

SCHOOLS FOR GENERAL APPRENTICESHIP.

This class of schools differs from the special trade schools above spoken of in aiming to prepare their pupils for any one of several mechanical employments which they may prefer. They may be appropriately called workshop schools, for they are provided with both school-rooms and workshops, and instruct their pupils in the various branches of an intellectual education, as well as train them in different kinds of handiwork. In the form of evening schools, Sunday and holiday schools, and ordinary day schools

they are quite numerous in several European countries. By way of showing the place they fill, and explaining their management, I can think of nothing better than to repeat what I said in 1876, concerning the "Artisans' School" at Rotterdam, in the Netherlands, so creditably represented at Philadelphia at the Centennial exposition, and again at Paris during the present year.

The artisans' school at Rotterdam was established in 1869, and is intended for the sons of workman. In order to gain admission they must be from twelve to fifteen years of age, and be able to read and write. An elementary knowledge of arithmetic is also required. The number of pupils is now about two hundred, and is increasing. They pay a small fee, and are expected to remain in the school for three years. The institution is both a school and a workshop. In the school are taught, for a part of the day, the branches in which instruction is usually given in our common schools, together with algebra, geometry, elementary mechanics and physics, drawing, singing, etc. The workshops in which the remaining part of the day is spent are arranged for different trades, and are large and comfortable. There are shops for each of the following classes of workmen: carpenters, blacksmiths, metal-workers, masons, stone-cutters, cabinet-makers, wood-carvers, metal-turners, and others less important.

For the following information concerning the school we are mainly, indebted to a report of the directors:

The practical instruction, certainly the most important for the class of pupils admitted to the institution, who when they leave school must be fit for practical life, is given in the afternoon in special workshops by clever masters, where the boys are taught for carpenters, smiths, braziers, painters, masons, stone-cutters, cabinet-makers, wood-carvers, modelers, turners, etc. All petty work is entirely excluded; the boys are as much as possible occupied with work of solidity and utility, either for use in the school, or for sale to the trade. This instruction is given in such a way that without exaggeration, it may be said that the pupil, from the moment of entering the school, or in this instance the workshop, enters into real life. In the first place he is made familiar with the tools, and immediately afterwards intrusted with work, which, when finished, has a real destination, so that his task is never useless in his own eyes. The ambition and the desire to do right are kept more alive in this way, than by working without a well defined aim. Moreover experience has taught that a promise to be allowed to work at a large and *bona fide* piece of workmanship excites ambition in boys.

The workshops are all as far as possible up to the standard of the present day, and provided with all necessary tools and conveniences of the most approved kind and quality. The boys are not allowed even to handle imperfect or worn-out tools. In the carpenter's shop, where more than eighty pupils are taught together, there are a sufficient number of benches, with all requisites thereto belonging; and in the smithies, with seventy boys, are all needed forges, anvils, vises, benches, &c.

Besides, the continual enlargements and improvements of the several workshops, required by the increasing number of pupils, constructed by the boys themselves under the eye of the masters, the carpenters make chests for the school, benches, trestles, ladders and steps, windows, doors, desks, &c. The smiths make big nails, cramps, hooks, hinges, locks, stoves with appurtenances, screw nuts, smiths' tongs, girders, &c. The braziers make different kitchen utensils, as water-cans, soap-tins, baking-pans, kettles, dust-pans, springs, stair-rods and eyes, basins, &c. The braziers are also taught stretching, turning, forging and soldering. The instrument makers, working in the smithies, are instructed in the cutting of screws and worms, the forging of steel and copper, and the casting of copper objects. The masons make different joints, plain walls, foundations, chimneys, niches, sewers, arches, &c. The stone-cutters make sink-stones, steps, stone thresholds, keystones, and beside this, they are taught the hewing of slabs, transposing stones, placing finished pieces of masonry, flooring tiles and placing plinths. The painters are instructed how to make putty, to grind paint, to stop, to smooth, to rub, to cut and set window glass, to write and paint letters, and to imitate wood and marble. In the workshops for cabinet-makers, wood carvers, and turners, they make benches, lime and screw tongs and other tools, drawers and modeled and carved ornaments.

That the boys attain a good degree of skill in their work, was plainly proven by the collection of articles made by them and exhibited at Philadelphia and Paris. Those who examined them closely, and understand the character of the institution making the exhibit, were both surprised and delighted with the result. Their interest was greatly increased when told that the experiment at Rotterdam had shown that boys who are occupied one half the day with books in the school, and the remaining half day with tools in the shops, make about as rapid intellectual progress as those of equal ability who spend the whole day in study and recitation. And in addition, the mechanical skill they acquire is of immense value.

INDUSTRIAL DEPARTMENTS.

The outline of the subject we have in hand would be in complete without some reference to industrial departments in connection with the public schools. The opinion that some kind of manual labor should be connected with book learning in schools for the young has been held for a long time by many leading educators. Among them Francke, Hecker, Pestalozzi, De Fellenberg, and Frœbel. The central educational authorities in several States have manifested a deep interest in the matter, and we now find throughout Europe certain industries connected with almost every elementary school. These industries are mostly intended for girls, although boys are frequently taught practical horticulture in the gardens attached to the schools, and sometimes the elements of mechanics. In the schools for girls several hours are set apart each week for instruction in sewing, knitting, mending, cutting-out, embroidery, crocheting, lace making, making and designing patterns, etc. Instruction is commenced with the simplest kind of work, and proceeds, step by step, to what is more difficult. In cutting-out it is not sufficient that the patterns are correctly followed, but the pupils are required to use their material with the greatest economy. In the work of instruction one step must be mastered before proceeding to the next. The pupils are arranged in classes, and all the members of a

class must do the same kind of work. The schools generally have work-rooms with suitable tables. They are also supplied with blackboards, frames, slates, etc. I have seen, in the school-rooms, albums containing specimens of goods with which the pupils are familiarized, and portfolios and frames, with displays of scholars' work, are not uncommon. Lessons of absorbing interest are given in selecting, cutting out, and making dolls' clothing. Thousands of dolls dressed in this way by little French school girls were exhibited at Paris.

In addition to needle work, instruction is sometimes given in housekeeping and domestic economy. Among the topics considered in this connection are the following:

Adapting Expenditures to Income.—With a given income to determine the kind of house, garden, furniture, etc.

Clothing.—Clothing adapted to the season, warm, cold; providing and taking care of clothing; material, color, cost.

Food.—Its kinds, sources, uses, cost.

Preserving Food.—Salting, drying, canning, preserving, &c.

Cooking.—Modes of cooking, economy in cooking, &c.

Preparing Meals.—Dining-rooms, tables, table furniture, table etiquette, &c.

Housekeeping.—Parlor, kitchen, cellar, pantry, bed chambers, order, cleanliness, system, economy.

Nor must this branch of the subject be laid aside until reference has been made to the remarkable experiments now being made in Paris to connect fully systematized industrial departments with the public schools. The most prominent efforts of this kind are those of the Municipal School of Apprentices, Boulevard de la Villette, established in 1873, and the School of Apprentices de la Rue Tournefort, established in 1876. Both are connected with public schools, and are under the same management as the schools of which they form a part. The two schools for apprentices are alike in their general arrangements, except that the one on the Rue Tournefort has a department for girls as well as one for boys. The displays of both at the exposition were very creditable, as well as extremely interesting. A few details concerning the nature and plan of these experiments will be given. We shall keep particularly in mind the experiment at the Boulevard de la Villette.

The object of these industrial departments is to prepare intelligent and skillful workmen. The scholars receiving instruction in them belong to the public schools, of which they are a part. When they reach a certain stage of intellectual advancement, if between thirteen and sixteen years of age, they are allowed to enter upon their industrial course. This course continues through three years, and the pupils are formed into three corresponding divisions. The day comprehends six hours of shop work and five hours of school work for the first two sections, and eight hours of shop work and three hours of school work for the third or most advanced section. The two kinds of exercises are separated by rest for eating and recreation. The instruction is gratuitous, as are also the material and tools used in work. The schools open at seven A. M., and close at seven P. M. All the scholars pursue the same course. The programme of studies includes the studies of one of our grammar or high schools, with reports of visits to work-shops; the application of chemistry and physics; lessons on machines, such as water-wheels, pumps, steam engines, etc., materials, their nature, power of resistance, etc., drawing. There are shops for working in iron, copper, and wood. Pupils have the privilege of learning special trades, like forge work, cabinet-making, carpentery, turning wood or metals, adjustage, modeling, etc. Each boy has his day's work cut out for him through the whole course, and he must do this well before he can be advanced. The course of work, as well as the course of study, is arranged in a strictly logical manner, and the two run parallel. The machinery of the shops is run by a steam engine. Among the furniture of the shops is a circular saw and other tools requiring skill in handling, but no accidents have ever occurred.

The boys who work and study are said to fall very little behind the boys of the same age, who do nothing but study. The working boys are said to be remarkably healthy, strong, good-humored and orderly. A large majority, after leaving, follow the trade learned at school. The statistics of the schools seem to show that the boys, at the end of their course, readily obtain employment and fair pay. The models and casts, and the work in wood, iron, and copper, shown at the exposition, bear strong testimony in favor of the success of an effort that must attract attention among the friends of public education wherever known.

It is not to be expected that any system of industrial education that has grown up in the Old World can be brought to this country as a whole, and transplanted without important modifications. Our different social and political condition will prevent it. But it is acknowledged on all hands that we must do something in this direction, and I trust we may be wise enough to use the experience of foreign countries as a lamp to guide our own efforts. My views as to the practical measures we ought to adopt, were so fully expressed in my last annual report, that they need not now be repeated.

CONCLUSION.

I have great reason to thank the successive Legislatures that have assembled at the capitol since I have occupied my present position, for the consideration they have respectively given to the recommendations concerning the interests of popular education that have been made in my several annual reports. I sincerely hope those I now have the honor to present will receive the same kind treatment.

J. P. WICKERSHAM,
Supt. Public Instruction.

BOOK NOTICES

TOPICAL COURSE OF STUDY. *For the Common School of the United States. By R. C. Stone. Pp.; 116. Price, 50 cents. New York: A. S. Barnes & Co.*

This is a compilation from the courses of study of successful public schools, as well as those recommended by educators of prominence. The author makes special acknowledgments to the superintendents of the schools of New York, St. Louis, Boston, Detroit, Chicago, San Francisco, Nashville, Louisville, and other cities. The design of the book is to aid in establishing a common gradation of schools in different parts of the country, as well as to utilize to better purpose the time and effort of both pupil and teacher, by substituting topical work for the "page" measure of the average text-book. The topics in each branch are presented in what is believed to be their natural order of sequence, and the course is of very general adaptation. Of course, any or all text-books bearing on the given topics may be used by the student. As the pupil is expected to *write* on each subject, in its proper order, he thus makes *for himself* a text-book, on each branch, in his own words, which at the same time becomes a record of his daily work. A method of instruction such as this means work; but it also means progress both marked and rapid.

MONROE'S PRIMARY READING CHARTS.—*Fifty in Number. Size, 25x30 Inches. By Lewis B. Monroe, Dean of Boston University School of Oratory. Philadelphia: Cowperthwait & Co. Price, $7.00.*

MONROE'S CHART PRIMER.—*First Steps in Reading. Designed to Accompany the Charts. Same Author and Publishers.*

These charts were evidently "a hint from Paradise" in the interest of the little ones. The first simple words used are without silent letters, purely phonic, in such expressions as are natural to children. Silent letters are afterwards introduced, printed in outline type, suggesting the letter without the sound. As the pupil progresses, everything previously learned is made more familiar by frequent repetition, until he reads simple sentences scarcely conscious of any effort in doing so. Full twenty-five pages of the charts embrace purely phonic letters, after which the silent letters appear, shadows of sound without substance. By the use of this outline type difficulties as to pronunciation are readily overcome. A marked advantage of charts like these over books is that the attention of a large class of pupils may be held more closely to the exercise. The large and handsome forms of the type also enable the young learner more readily to perceive differences between letters somewhat resembling each other. The subject matter of the charts is admirably simple, well arranged, and graded to suit the practical wants of the school room. We endorse the following opinion of these valuable aids to primary work, from one of our exchanges: "Were we possessed of autocratic power, we should place a set of these charts in every primary school in the land. We give them this hearty approval, and hope the school committees and others interested in education, will 'place them where they will do the most good.' If the school committees should be slow in action, we doubt not there are hundreds of primary teachers who would rather procure these aids at their own expense than to be without them." A leading teacher of New England says of them: "I had regarded the First Reader as about perfect, but felt the need of having some of the first lessons on Charts, so as to hold the attention of the class upon the same word. With these Charts I have no difficulty in getting and holding the attention of the children. In fact, it would be hard to decide who is the most interested in the recitation, teacher or scholars. The illustrations are very pleasing, and the talks about them are a great help in gaining distinct enunciation and expression. It is a source of satisfaction to the little ones to know each day that they have learned something. I am daily surprised at their progress. I turn to a new lesson. We talk it over, learn the new sound, analyze the letter standing for it, sound the new words and read the lesson. I will then cover the Chart and give each child a slate and pencil, and let them write all the new words, sounding them as they write. I find they do not forget either words or sounds, but can easily read whole phrases which I afterward put on the board. I greatly appreciate the labor and study you have bestowed upon these first lessons."

ATLAS ESSAYS NO. 3.—*Labor. The Republic. A S. Barnes & Co., New York, Chicago and New Orleans.* 1878.

These essays originally appeared in the *International Review* published by the same house. There are ten of them, and among their authors are the well-known names of Thomas Hughes, M. P., and Edward A. Freeman, LL.D., of England; and General Francis A. Walker, General Franz Sigel and Dr. E. D. Mansfield, of the United States. The subjects treated are well expressed in a general way by the words used on the title page of the work: *Labor. The Republic.* These are among the great questions of the times and those seeking light upon them will find rich food for thought in the pages of the essays now before us. W.

THE POPULAR SCIENCE MONTHLY SUPPLEMENT. For *December*, 1878. *D. Appleton & Co., New York.*

With this number of the *Supplement*, we reluctantly bid it adieu as a regular monthly publication. But, through the liberality of the Messrs. Appleton, a firm animated by large and generous impulses, the size of the *Monthly* itself is to be so increased as to include many such papers as have given its distinctive character to the *Supplement*, the price of the enlarged *Monthly* continuing, as heretofore, $5.00 a year. The *Supplement* will, however, though discontinued as a regular serial, be issued "at irregular intervals, depending upon the pressure of foreign articles demanding republication." The publishers do not claim too much when they say that this scientific magazine has contained "the largest amount of varied and valuable mental work to be found within equal limits in any periodical in any country." The most distinguished English, German, French and Italian savants have been drafted into its service, and almost every topic of interest to mankind has been discussed with signal ability, from the use of alcoholic beverages to the comprehensive study of Sociology, and from local geological phenomena to the nebular hypothesis; and all this in such way as to render the thoughts accessible to every reader of good average intellectual power, and respectable mental training.

We have only room to say that the leading article of the December number of the *Supplement*, "The Recent Development of Socialism in Germany and the United States," a lecture introductory to a gen-

eral course on this topic, and delivered at Cambridge, England, by Prof. Henry Fawcett, is one which must be in the highest degree acceptable to every reader who desires to examine in a philosophic spirit into the causes of those pernicious communistic tendencies which are now threatening to assume a very dangerous practical character. Nothing but a greatly more thorough understanding of the nature of our difficulties can save us from more wide-spread and disastrous calamities than the Molly Maguire murders and the Pittsburgh riots. We hope Prof. Youmans will continue to give us, serially, the reports of Prof. Fawcett's lectures; nothing he could present to us would be more instructive, judging, from this introductory discourse. We learn through a private channel, that until very recently, the *Monthly* has barely paid the expenses of its own publication. We hope it may now be regarded as permanently established.

NEW PRACTICAL ALGEBRA: *By James B. Thomson. New York: Clark & Mayard. 1878.*

This is an effort to combine the principles of the science of Algebra, "with their application to methods of business," a proposition which would greatly have disgusted Plato, who disdained to teach even arithmetic for business purposes, regarding such teaching as a prostitution of the noble science of numbers, fit only for handicraftsmen, and utterly unworthy of the philosophic mind which seeks truth for its own sake. This practical nineteenth century takes a very different view of things, and we are in imminent danger of running into the other extreme, and devoting ourselves to no study unless, to use a current slang phrase, "it has money in it."

The author has evidently sought to render his introduction to the study of Algebra as simple as possible, and he has succeeded so well that any one acquainted with common arithmetic may make rapid progress with little aid from any other source than this text-book, which may be honestly recommended to all who desire to begin the study. In these days there can be scarcely any excuse for ignorance of the general principles of science but intellectual sluggishness, which we hope the reader does not consider a very good one.

ELEMENTARY GEOLOGY. *Designed Especially for the Interior States. By E. B. Andrews, L.L. D. 12mo. Pp.: 283. With 432 Attractive Illustrations. Cloth, $1.00. Cincinnati: Van Antwerp, Bragg & Co.*

We are moving on. The elements of the sciences of Philosophy, Botany, Astronomy, Natural Philosophy, and Chemistry will presently be taught in the schools in such a manner as to attract the attention and arouse the interest of the average pupil. Boys and girls will then have a fair knowledge also of the earths, and soils, and rocks about them, of the order of their formation, and the theories of the geologist as to the condition of the earth and its cotemporaneous geologic history during one or another of the far-off geologic periods. The text-book under notice is a simple manual, lavishly but admirably illustrated, descriptive of the formations of what are termed the "Interior States." It treats of the surface features of these States, the ir rocks and ores, how rocks are formed, the inclination of rocks; of historical and geographical geology, the classification of animals and plants, the different geologic ages, among them the coal measures, the ages of reptiles and mammals, and the drift and recent periods, coming down at last to Man, the progress of life upon the Earth, and the theories explaining it. The work is written in a style of unusual interest, not only for the student-teacher, but also for the general reader who would know something of the science of Geology.

NORMAL UNION SYSTEM OF INDUSTRIAL DRAWING. *In One Series: Numbers 1 to 8. Primary Exercises Now Ready. By J. V. Montgomery, Teacher of Drawing, State Normal School, Millersville, Pa. Philadelphia: Sower, Potts & Co.*

We had hoped to present a notice at length of this excellent system of Drawing, but must defer it to our next issue, merely calling attention to the advertisement of the Publishers elsewhere in this number. Prof. Montgomery, we think, has done far more work than any other man in Pennsylvania, in creating sentiment favorable to the general introduction of Drawing into the schools. The best years of his life have been given to the study of the subject, and to the working up of a practical and teachable system of Drawing, testing it at every step in the Model School classes and in the hands of the student-teachers under his care. Montgomery's Normal System will make itself known in all parts of the country.

NATIONAL SUDAY-SCHOOL TEACHER. *Chicago: Adams Blackmer, & Lyon Publishing Company.*

This is the time when the majority of Sunday-schools are looking about for lesson helps for the year. We would suggest that *The National Sunday-School Teacher* be examined before choice is made. The December number is all that could be asked in the way of a lesson help. Its departments severally, "Geographical," "Biographical," "Historical," and "Antiquities," together with the exposition of the lessons, pour a flood of light upon the Scriptures that is marvelously helpful. In this number is a "Christmas Concert Exercise," which will commend itself to those who want something good for that occasion, while the hints on review, both quarterly and annual, are just what is needed. This journal also contains hints upon methods for conducting Sunday-schools, gathered from experience. Those who want to know how successful superintendents carry on their schools should take this magazine. There comes with it a now magazine of twenty-four pages for the scholar, called *The National Quarterly.*

THE founder of *Godey's Lady's Book* has just been borne in honored old age to his long home, but the "Book" itself looks as young and bright as it did when we first knew it forty years ago. It has now entered upon its forty-ninth year. The number for January lies on our table. The new owners of the magazine are Mr. J. Hannum Jones and his sister, Mrs. A. E. Browne, with Mrs. S. A. Shields as managing editor. Mr. Jones has been for nearly five years General Manager of the Inquirer Printing and Publishing Company of Lancaster, and besides knowing all about the printing business, he is a gentleman of intelligence and enterprise. With him at the head of the management, the patrons of *Godey* may expect to have all the features of the magazine that have for so many years made it such a welcome visitor in hundreds of thousands of households carefully preserved and new ones, even more attractive, judiciously added from time to time. There can scarcely be a doubt of the future success of the magazine. It once had a circulation of 150,000; we would not be surprised to see it reach that figure a second time. The publishers even promise that they will make the twelve issues for 1879 among the best that ever left their presses, notwithstanding the reduction of the yearly subscription to two dollars; and, knowing them as we do, we believe they will make their promise good. W.

ABOUT the worst use a congregation can make of a choir is to leave it to do the singing for the people. To say nothing of human worship by proxy, the congregation which leaves the choir to do all the singing misses many advantages. Yet this is too often the case, and in some quarters increasingly so. In too many places of worship the work of the choir is becoming a separate and independent performance, and the body of the congregation look on with indifference or listen with interest, as the case may be. You may call it a Sunday concert in the House of God, but never call it congregational worship when the people pay little heed to the singing, and take little personal part in it. Either the congregations should take more part and interest in the vocal worship, or leave it to the choir altogether, merely following them, programme in hand, as at an oratorio. Few congregations are prepared for such a decision as would exclude them altogether from the singing part of worship except as listeners. Then, if they would not give up their right to sing, let them show their appreciation of the privilege by more skillful and hearty singing. Good congregational singing is not to be had without toil and cost. If it could come by merely wishing for it, then many congregations would sing much better than they do. They need to inform themselves what really is good congregational singing, and then lay themselves out for it accordingly. A

WHAT FAIRY-LIKE MUSIC.

DE PINNA.

p Grazioso.
1. What fai - ry - like mu - sic steals o - ver the sea, En - tran - cing the
2. The winds are all hush'd, and the wa - ters at rest; They sleep like the
sen - ses with charm'd mel - o - dy? 'Tis the voice of the mer - maid, that floats o'er the
passions in in - fan - cy's breast; Till storms shall un - chain them from out their dark
f
main, As she min - gles her song with the gon - do - lier's strain! 'Tis the voice of the
cave, And break the re - pose of the shore and the wave. Till storms shall un -
f
mermaid, that floats o'er the main, As she mingles her song with the gon - do - lier's strain.
chain them from out their dark cave, And break the re - pose of the shore and the wave.

minister cannot from the pulpit give much advice about singing; still less can he go into the details of art criticism. A few remarks occasionally, calling upon all the congregation to join more heartily in the singing, is the most that he can undertake with propriety and success. The congregation needs to be called together apart from worship, and solely for practice and instruction in the vocal art. A skillful and judicious teacher can soon point out the usual faults and lead them on by intelligent practice to better work. Occasional practice in congregational singing is indispensable, and there is no first-class work done without it. The exercises for the production of the voice should be gone through, as also exercises in the different intervals and through various keys. A month's practice of this kind will be of more use for improvement than the singing of a hundred tunes. Those who take part in the psalmody of the congregation should be encouraged to practice the exercises at home The unison practice has many advantages, but it does not supersede private practice. The defects of the voice may be pointed out very clearly in the singing class, where more or less individual instruction may be given, but they can be most effectually corrected by private practice; and those who will persevere in private for only half an hour a day will soon be able to make a better public contribution to the general worship of song.